



AGRICULTURAL RESEARCH INSTITUTE
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JOURNAL

OF THE

New York Entomological Society.

VOL. XXVIII.

MARCH, 1920.

No. 1.

RECORDS AND DESCRIPTIONS OF NEOTROPICAL CRANE-FLIES (TIPULIDÆ, DIPTERA). II.

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The crane-flies discussed in the present article are almost without exception from South America. They are based largely on collections made in 1919 near Para, Brazil, by Mr. Herbert S. Parish, the veteran insect collector of the American Tropics. Several other interesting species were sent me by Señor Charles Bruch, collected near La Plata, Argentina, and a few others taken by Dr. Witte in the Province of Santa Cruz, Southern Patagonia. The types are preserved in the collection of the writer; paratypes of several Argentinian species in the Museum at La Plata.

Genus *Geranomyia* Curtis.

Geranomyia argentinensis new species.

Head gray, the genæ more buffy; mesonotum dull yellow, the præscutum with three very broad brown stripes that are nearly confluent; femora with an indistinct, narrow, brown subterminal ring; wings subhyaline, the stigma dark brown, vein *Sc* long, the basal deflection of *Cu*₁ before the fork of *M*.

Male.—Length (excluding rostrum), 5.8–6 mm.; wing, 6.3–6.8 mm.; rostrum, 3.2–3.4 mm.

Female.—Length (excluding rostrum), 7.5 mm.; wing, 7.5 mm.; rostrum, 3.3 mm.

Rostrum dark brown, rather elongate, the tips of the paraglossæ comparatively short. Antennæ with the scapal segments brown, the flagellum dark brown; basal flagellar segments oval, the terminal segments cylindrical. Head pale reddish, heavily gray pruinose, the genæ buffy. Vertex between the eyes rather narrow.

Mesonotum dull yellow, the præscutum with three very broad brown stripes that are practically confluent; scutum with the lobes largely dark brown; scutellum dark brown, broadly margined with yellow or, in some cases, entirely yellow; postnotum dark brown. Pleura uniformly dull yellow, the mesonotum whitish pruinose. Halteres brown, the base of the stem paler. Legs with the coxæ and trochanters yellow; femora pale yellowish brown, the tips a little brighter and with a very indistinct and narrow brown annulus; tibiæ light brown, the tips narrowly darker; tarsi dark brown. Wings subhyaline; stigma oval, dark brown; veins dark brown. Venation: *Sc* long, *Sc*₁ extending to about opposite two thirds the length of the long sector, *Sc*₂ not far removed from the tip of *Sc*₁; a supernumerary crossvein in cell *Sc* a short distance before the origin of the sector; *Rs* long, about three times as long as the basal deflection of *R*₄₊₅; basal deflection of *Cu*₁ some distance before the fork of *M*.

Abdominal tergites dark brown, the lateral margins of the tergites more yellowish; sternites yellowish. Male hypopygium with the ventral pleural appendage large, greatly exceeding the pleurites; two acute needle-like points on either side at the base of the ventral pleural appendage.

Habitat.—Argentina.

Holotype, ♂, Province of Buenos Aires (C. Bruch).

Allotype, ♀.

Paratopotypes, 5 ♂, ♀.

Geranomyia argentinensis belongs to the group of *G. canadensis* (Westwood) and is most nearly allied to *G. guatemalensis* Alexander from which it may be told by the shorter rostrum, the different thoracic and abdominal pattern, the less distinct brown femoral ring, and other details.

Genus *Dicranomyia* Stephens.

Dicranomyia amazonica new species.

Size large (wing of ♂ over 8 mm.); general coloration black, the præscutum reddish with a shiny black median stripe; wings grayish brown, the costal region and narrow seams along the cord darker brown, *Sc* long, cell 1st *M*₂ small, subquadrate.

Male.—Length, 7.8 mm.; wing, 8.5 mm.

Rostrum and palpi dark brown. Antennæ black throughout, the last segment elongate subulate. Head dark brown, gray pruinose, the vertex narrowed between the eyes, the latter with large coarse ommatidia.

Mesonotal præscutum reddish with a conspicuous black median stripe that is broadest and most distinct in front, becoming obliterated before the suture; scutum, scutellum and postnotum black. Pleura mostly black, the mesepimera a little paler. Halteres dark brownish black. Legs with the coxæ dull reddish, the fore coxæ black; trochanters dull reddish; femora black, the bases narrowly reddish; remainder of the legs black. Wings grayish brown, the wing-base indistinctly brighter; the costal region, stigma, tip of the wing and narrow seams along the crossveins and deflections of veins dark brown; veins dark brown, R , Cu and $2d A$ more yellowish. Venation: Sc long, extending to beyond midlength of the long sector, Sc_2 at the tip of Sc_1 ; r at the tip of R_1 , longer than the apex of R_1 beyond it; cell $1st M_2$ small, subquadrate; basal deflection of Cu_1 before the fork of M ; Cu_2 shorter than the deflection of Cu_1 .

Abdominal tergites black, the caudal margins of segments two to five broadly but indistinctly paler; sternites reddish brown. Hypopygium conspicuously reddish orange; pleurites elongate, much longer than the relatively small appendages; penis-guard conspicuous, about as long as the pleurites.

Habitat.—Brazil.

Holotype, ♂, Igarapé-Assú, Para, July 16, 1919 (H. S. Parish).

Paratype, ♂, Obidoo, September 10, 1919 (H. S. Parish).

Dicranomyia sanctæ-cruzæ new species.

General coloration reddish yellow; antennal flagellum dark brown; legs yellow, only the terminal tarsal segments darker; wings yellowish subhyaline with sparse dark brown marks at the stigma, along the cord, at crossvein m and on the $2d Anal$ vein.

Male.—Length, 8.4 mm.; wing, 12 mm.

Female.—Length, 9–9.3 mm.; wing, 11.5–12.6 mm.

Rostrum and palpi light yellow. Antennæ with the scapal segments brownish yellow, the flagellar segments dark brown, the intermediate flagellar segments oval in shape. Head reddish brown with a microscopic dense white pubescence, the median line of the vertex darker. Eyes rather widely separated by the vertex.

Thorax reddish yellow, the mesonotal præscutum with very indistinct darker reddish stripes. Pleura reddish brown. Halteres pale. Legs with the coxæ and trochanters dull yellow; remainder of the legs pale yellow, the two terminal tarsal segments dark brown; last tarsal segment longer than the penultimate; claws with three teeth. Wings subhyaline, the yellow veins surrounded by a pale yellow tinge; stigma brown, connected with a brown seam at the fork of Rs ; Cu_2 and the basal deflection of Cu_1 seamed with brown; a large brown area on crossvein m ; the distal half of vein $2d A$ with a large dark brown seam. Venation: Sc_1 ending opposite the origin of Rs , Sc_2 a short distance back from the tip so that Sc_1 alone is a little longer than r ; basal deflection of R_{4+5} about one half the length of the feebly sinuous sector; cell $1st M_2$ closed; basal deflection of Cu_1 at or some distance before the fork of M .

Abdominal tergites reddish brown, the sternites yellowish, the subterminal

sternites a little darker. Male hypopygium rather large, the pleurites slender, on the ventral inner face produced proximad into a prominent lobe that is covered with appressed hairs; ventral pleural appendage large. Ovipositor with the valves nearly equal in length, or the tergal valves a little shorter than the sternal valves, the tips acute; the tergal valves are blackened and with the dorsal edges minutely serrate.

Habitat.—Argentina (Patagonia); Tierra del Fuego.

Holotype, ♂, Valle Tunel, Santa Cruz (Dr. Witte).

Allotopotype, ♀.

Paratopotype, ♀; paratype, ♀, Tierra del Fuego (Ohlin).

Dicranomyia sancta-cruza is a large, vigorous species that resembles *D. chlorotica* (Philippi), but is readily told by the handsomely spotted wings.

The paratype is in the Reichsmuseum in Stockholm.

Genus *Rhipidia* Meigen.

Rhipidia (*Rhipidia*) *costaloides* new species.

Antennæ black; general coloration black, the anterior part of the præscutum more reddish brown; wings pale gray with a grayish brown pattern along the veins.

Female.—Length, 4.8 mm.; wing, 5.3 mm.

Rostrum and palpi dark brownish black. Antennæ black throughout. Head dark.

Mesonotal præscutum reddish brown, becoming darker posteriorly, the remainder of the mesonotum likewise dark. Pleura dark, the sternum more yellowish. Halteres pale brown, the knobs darker. Legs with the coxæ dark basally; trochanters brown; femora brown; remainder of the legs broken. Wings pale gray subhyaline with a moderately heavy grayish brown pattern as follows: six costal blotches that are approximately as large as the interspaces between them, the first at the arculus, the third at the origin of R_s , the fifth subocellate, at the stigma, the sixth at the end of vein R_{2+3} ; broad paler gray seams along the cord and outer end of cell 1st M_2 . Venation: Sc ending just beyond midlength of R_s ; r at the tip of R_1 ; deflection of R_{4+5} about as long as cell 1st M_2 ; inner end of cell 1st M_2 not conspicuously arcuated; basal deflection of Cu_1 some distance before the fork of M .

Abdominal tergites reddish brown, the caudal margin of the segments broadly dark brown; sternites dull yellow, the segments conspicuously ringed with blackish brown as an annulus on the caudal margin of the segments and on the cephalic margin of the following segment; genital segment dull yellow. Ovipositor with the valves short but heavily chitinized; tergal valves slender, strongly upcurved at the acute tips; sternal valves long, ending about on a level with the tergal valves, straight, the tips acute.

Habitat.—Panama.

Holotype, ♀. Quebrada Richa, a branch of the Rio Tapaliza, a branch of the Rio Puerto, altitude 1,300 feet, July 24, 1918 (Axel Olsson).

This small species is closest to *Rhipidia costalis* Williston of Central America and the Lesser Antilles. In order to supplement Williston's brief description, which applies equally well to more than one species in the Neotropical fauna, Mr. W. D. Lang, of the British Museum of Natural History, has very kindly sent me an enlarged accurate drawing of the wing of the type specimen of *R. costalis*. This figure agrees in all the essentials with the fly determined by the writer as *costalis* in an earlier paper (JOURN. N. Y. ENT. Soc., Vol. 22, pl. 3, fig. 2; 1914), the dark markings along the costal margin being considerably larger than the pale interspaces, the radial sector very long, the basal deflection of R_{4+5} comparatively short, basal deflection of Cu_1 just beyond the fork of M and other characters. In Mr. Lang's figures, cell first M_2 is shorter and broader than in the specimen above mentioned. *R. costaloides* is readily told by the reduced costal pattern and the venational details.

Genus *Teucholabis* Osten Sacken.

Teucholabis mendax new species.

General coloration reddish, the præscutum with three broad black stripes; head shining black; pleura with large black blotches; legs yellow throughout; wings subhyaline, the apex and a broad seam along the cord slightly brownish.

Male.—Length, 7 mm.; wing, 6.4 mm.

Rostrum pale brown, the palpi dark brown. Antennæ dark brown, the basal segments only a little paler. Head intense shiny black.

Pronotum shiny dark brown, the scutellum more reddish. Mesonotal præscutum reddish yellow with three intense black stripes that are very extensive, the interspaces restricted; median stripe ending before the suture; lateral stripes very broad, nearly circular in outline, continued caudad onto the scutal lobes; remainder of the mesonotum reddish, the postnotum with a distinct median and less distinct lateral stripes on the caudal half. Pleura orange-yellow with large jet black areas, smallest on the propleura; two large blotches on the mesopleura, the largest on the mesepisternum, extending from the sternum to the dorsopleural membranes; a smaller oval area immediately cephalad of the halteres. Halteres small, reddish, the stems a little darker. Legs dull yellow throughout, the femora somewhat thickened. Wings subhyaline with the apex and a broad diffuse seam along the cord very indistinctly darker; stigma dark brown; veins dark brown, the basal and costal regions more yellowish. Venation: *Sc* rather long, extending to about midlength of the sector;

r inserted a short distance beyond the line of the cord; cell *1st M*₂ long and narrow, about as long as vein *M*₁₊₂ beyond it, longer than *M*₃ beyond it; basal deflection of *Cu*₁ at about one fourth the length of cell *1st M*₂.

Abdomen reddish. Hypopygium weakly armed; an outer flattened pale blade that bears a few long setæ; a long-curved appendage that terminates in a blackened needle-like point; an inner, bifid heavily chitinated appendage with the anterior blade flattened, the edge indistinctly two-toothed, truncated or slightly concave; penis-guard stout, the tip blackened.

Habitat.—Brazil.

Holotype, ♂, Prata, Para, June 30, 1919 (H. S. Parish).

Teucholabis mendax is readily told from all its relatives by the unusually pale banded wings and the shining black head.

Teucholabis persimilis new species.

General coloration light brown, the pleura yellow, wings yellow, crossvein *r* lacking, veins issuing from cell *1st M*₂ long.

Female.—Length, 4.6 mm.; wing, 4.5 mm.

Rostrum pale brown, the palpi darker. Antennæ unusually long for this genus of flies, if bent backward extending to beyond the wing-root; brown, the basal segment a little paler; flagellar segments long-cylindrical with long verticils and a dense white pubescence. Head brownish yellow, sparsely white pruinose; vertex between the eyes broad.

Pronotum yellowish medially, the scutellum more whitish, the pleural regions more brownish. Mesonotum light brown, sparsely pollinose, the median area of the scutum and postnotum more yellowish. Pleura yellow, the dorsal pleurites somewhat darker. Halteres brown, the knobs dark. Legs dull yellow, the terminal three or four tarsal segments dark brown; claws small, untoothed, empodia conspicuous. Wings with a strong yellowish tinge; stigma indistinct, grayish; veins brownish yellow. Venation: *Sc* rather long, *Sc*₁ very long, extending to beyond midlength of the long sector, *Sc*₂ far from the tip of *Sc*₁ and slightly proximad of the origin of *Rs*; *r* lacking; veins *R*₄₊₅ and *R*₄₊₃ long, curved caudad and running parallel at their ends; cell *1st M*₂ narrow, shorter than the veins issuing from it; basal deflection of *Cu*₁ a short distance beyond the fork of *M*.

Abdominal tergites dark brown, the sternites more yellowish. Ovipositor with the valves long and slender, strongly upcurved, the tips acute.

Habitat.—Brazil.

Holotype, ♀, Igarapé-Assú, Para, July 15, 1919 (H. S. Parish).

This curious little fly is referred to the genus *Teucholabis* with considerable doubt. The radial cross-vein is completely lacking and vein *Sc*₁ is very long for a member of this genus of flies. *T. persimilis* bears a great resemblance to *T. parishi* Alexander (Psyche,

Vol. 20, pp. 46, 47; 1913) which must likewise be considered a doubtful member of the genus. The present species may be told by the long antennæ and the details of venation, especially the shorter subcosta, the lack of a spur of vein R_{2+3} , and the shorter cell first M_2 with the longer veins issuing from it. That the spur on R_{2+3} in *T. parishi* is a normal condition for this species is shown by the fact that it bears a macrotrichia on this spur in both wings of the unique type, this undoubtedly representing the origin of vein R_2 .

Genus *Gonomyia* Meigen.

Gonomyia (Gonomyella) parænsis new species.

Antennæ with the basal segments light yellow, the flagellum brown; head yellow, silvery pollinose; mesonotum lead-colored, the lateral margins narrowly light yellow; wings strongly tinged with brownish yellow, cell R_2 very short, cell M_2 very deep.

Male.—Length, about 4 mm.; wing, 4.5 mm.

Female.—Length, 4.5 mm.; wing, 4.7 mm.

Rostrum and palpi dark brown. Antennæ with the first scapal segment light yellow, stout, moderately elongated; second segment tumid, dull yellow; flagellum slender, brown, the segments with a dense white pubescence, in the male with long, second verticils. Head light yellow, darker on the occiput, covered with a sparse silvery white pollen that is most distinct on the anterior part of the vertex.

Pronotum yellow medially, the sides dark. Mesonotal præscutum dark lead color, sparsely pollinose, the lateral margin narrowly but conspicuously light yellow, two indistinct brownish stripes occupy the region of the interspaces; remainder of the mesonotum dark plumbeous. Pleura dull yellow, with a broad, ill-defined, dusky, dorsal stripe. Halteres dark brown. Legs dull yellow, darkening on the tibiæ and tarsi, the latter dark brown. Wings strongly brownish yellow, the costal region more saturated; stigma indistinct; veins brown, the costal veins more yellowish. Venation: Sc_1 ending slightly before the fork of Rs ; fusion of R_{2+3} very long, the cell R_2 being shorter than in any other described American species of *Gonomyella*; r at about two fifths the length of R_{2+3} ; cell M_2 very deep; basal deflection of Cu_1 just beyond the fork of M .

Abdominal tergites dull yellowish brown, the sternites more yellowish; hypopygium dull brownish yellow. In the female the antennæ are shorter, the abdomen dark brown. Ovipositor horn-colored, the tergal valves very long, slender, upcurved at the tip.

Habitat.—Brazil.

Holotype, ♂, Prata, Para, June 30, 1919 (H. S. Parish).

Allotype, ♀.

The holotype male has the wings very much darker brown than in the female, the costal margin being especially suffused; in addition, the venational details are somewhat different, r being placed before one third the length of R_{2+3} ; R_2 considerably longer, slightly more than one half the length of R_3 ; basal deflection of Cu_1 some distance beyond the fork of M . With the exception of these rather conspicuous alar differences, the two flies are very similar to one another and until further material becomes available they must be considered as representing a single variable species.

Genus *Erioptera* Meigen.

Erioptera (Erioptera) micromyia new species.

Size very small (wing of ♀ under 3 mm.); general coloration pale brown, the thoracic dorsum unstriped; wings grayish; ovipositor very long and slender.

Female.—Length, 3.3 mm.; wing, 2.8–2.9 mm.

Rostrum yellowish brown; palpi dark brown. Antennæ moderately long and slender, brown. Head light brown, sparsely gray pruinose.

Mesonotum light brown, the præscutum without stripes; tuberculate pits black, separated by a distance about equal to one and one half times the diameter of one. Pleura light brown, heavily light gray pruinose. Halteres with the knobs large, dark brown, the base of the stems pale. Legs with the coxæ small, pale testaceous, sparsely gray pruinose; trochanters testaceous; remainder of the legs brown. Wings grayish subhyaline; veins dark brown. Venation: As in the subgenus *Erioptera*; 2d anal vein moderately sinuate on its outer third.

Abdomen with the tergites dark brown; sternites more yellowish. Ovipositor with the valves very long and slender, acicular, gently upcurved; sternal valves similar in appearance to the tergal valves but more elongate, ending but a short distance before the tips of the tergal valves.

Habitat.—Brazil.

Holotype, ♀, Prata, Para, June 30, 1919 (H. S. Parish).

Paratopotypes, 2 ♀'s.

Genus *Ozodicera* Macquart.

Ozodicera attenuata new species.

Antennal segments four to nine with a single short pectination; segments ten to thirteenth very long and attenuated; dorsum of the præscutum with four brown stripes; lateral margins of the abdominal tergites brown.

Male.—Length, about 20 mm.; wing, 16.5 mm.

Frontal prolongation of the head reddish, shiny, narrowly darker dorso-medially; nasus short; palpi black. Antennæ rather long for this genus of

flies, the three basal segments orange, thence passing into black; segments four to nine each bears a single short pectination which is shorter than the segment that bears it; the last four flagellar segments are greatly elongated, filiform, their combined length considerably exceeding the remainder of the antenna. Head yellowish tawny, the vertex very narrow between the large eyes.

Mesonotal præscutum yellowish tawny with four dark reddish brown stripes; remainder of the mesonotum brown, sparsely pruinose, especially the postnotum. Pleura light reddish brown, sparsely white pruinose. Halteres brown, the knobs a little darker. Legs with the coxæ reddish brown, gray pruinose; trochanters and femora dull brownish yellow; tibiæ yellowish brown; tarsi dark brown, very long and slender. Wings light gray, the base of the wing and the costal region more brownish yellow; stigma elongate, grayish; veins yellowish brown, *C*, *Sc* and *Cu* more yellowish. Venation: tip of *R*₂ pale; *r-m* very short to almost obliterated by the approximation of veins *R*₄₊₅ and *M*₁₊₂; cell *M*₁ broadly sessile; *m-cu* obliterated by the punctiform contact of *Cu*₁ on *M*₃₊₄.

Abdominal tergites yellow, the lateral margins of the segments broadly brown, this mark widening on the fourth and succeeding segments to include most of the segments; sternites reddish yellow, segments seven and eight darker. Hypopygium reddish, the pleurites long, slender, bearing the compressed pleural appendages at their tips.

Habitat.—Brazil.

Holotype, ♂, Prata, Para, July 5, 1919 (H. S. Parish).

Ozodicera attenuata is closest to *O. gracilis* (Westwood) and *O. griseipennis* Loew. It is characterized by the very short antennal pectinations, the attenuated apical flagellar segments, the quadrivittate thorax and the dark lateral margins to the abdominal tergites. *O. gracilis* has the apical flagellar segments less elongated and the thorax subvittate; *O. griseipennis* has the median præscutal stripe entire and the abdomen with a dark brown dorso-median stripe.

Pectinotipula new genus.

Antennæ 13-segmented, in the male with the terminal ten segments each with two long pectinations that exceed in length the segments that bear them; flagellar segments verticillate. Venation with cell first *M*₂ small as in *Tipula*; cell *M*₁ long-petiolate. Male hypopygium as in *Tipula*, the ninth tergite, pleurite and sternite being entirely distinct; eighth sternite with a long, conspicuous median appendage. Coloration as in species of the *monilifera* group of the genus *Tipula*, the body with a capillary brown dorso-median line, the præscutum with the interspaces set with tiny brown setigerous punctures.

Genotype.—*Ozodicera argentina* van der Wulp (Argentina).

Enderlein (Zoöl. Jahrb., Vol. 32, pt. 1, p. 27; 1912) places *argentina* in his restricted genus *Ozodicera* under the mistaken belief that the antennæ are unipectinate. In reality, the antennæ in the male sex, at least, are long-bipectinate and of a structure that diverges widely from all species of the genus *Ozodicera*. Likewise in its wing-venation which is almost identical with the normal type of the genus *Tipula* and the simple male hypopygium this species departs from the compact type of *Ozodicera*. The presence of ten pectinate flagellar segments and the petiolate cell M_1 are ample characters upon which to remove this fly from *Ozodicera* to a position nearer the genus *Tipula*, to which it is obviously more nearly allied. The genitalia and color of the body closely resemble those of species of the *monilifera* group of the genus *Tipula* and it seems probable that the true affinities of this fly are not far distant from this group.

I am indebted to Señor Jörgensen for a specimen of this interesting fly, taken at Esquina Grande, Catamarca, Argentina, April 7, 1915.

Genus *Tipula* Linnæus.

Tipula bruchi new species.

Antennæ bicolorous; mesonotal præscutum with dark brown stripes; legs very long and slender, the tips of the femora and tibiæ black; wings with the costal margin yellowish, the membrane clouded with gray and with four dark brown blotches in the subcostal cell.

Male.—Length about 17–18 mm.; wing, 18–19.2 mm.

Hind leg, femur, 14.2 mm.; tibia, 16 mm.; metatarsus, 21.6 mm.

Frontal prolongation of the head slender, buffy, the sides darker; nasus slender with long yellow hairs. Antennæ short, the three basal segments dull yellow, the remaining segments yellow with the basal enlargement black; terminal segments more uniformly darkened; verticils longer than the segments that bear them. Head yellowish buff with a long dark brown median mark on the vertex; vertical tubercle rather conspicuous, brown medially, with an impressed median furrow.

Pronotum pale yellowish brown with three dark brown marks. Mesonotal præscutum light buff with three dark brown stripes, the median stripe divided by a broad pale line which, in turn, is split by a capillary dark brown median line; humeral region dark; scutum buffy gray, each lobe with two large dark brown marks; scutellum light brown with a dark brown median line; postnotum grayish, the posterior margin and median area more grayish, the latter with a capillary dark brown line. Pleura light buff, indistinctly spotted with

darker. Mesosternum indistinctly dark gray. Halteres rather long, the knobs dark brown with the apices dull yellow. Legs with the coxæ and trochanters brownish yellow; femora yellowish brown, the tips broadly black; tibiæ dark brown, the tips narrowly blackened; tarsi very long, dark brown, the metatarsi longer than the tibiæ. Wings subhyaline, with four dark brown subcostal blotches and a heavy grayish brown clouding in all the cells; cells *C* and *Sc* strongly yellowish; the first dark brown subcostal mark is at *h* and also includes the bases of cells *R* and *M* and extends into the costal cell; the remaining three marks do not reach the costal cell but send paler clouds caudad into cell *R*; the third mark, at the origin of *Rs*, is the largest, stigma rather pale brown; the grayish brown clouds include the apical half of cells *R*₂ and *R*₃; most of cells *R*₄ to *Cu*₁, conspicuous zigzag areas in cells *M*, *Cu* and 1st *A*; cell 2d *A* more uniformly darkened. Venation: Veins *R*₂ and *R*₃ strongly divergent, the base of cell *R*₂ being very narrow; cell 1st *M*₂ much longer than broad; *m-cu* distinct.

Abdomen with the first tergite buffy with a dark brown median mark; second tergite dark with only the basal half pale laterally; remaining tergites darker brown, indistinctly ringed caudally with paler; the lateral margins are marked with a brown streak; sternites similar to the tergites; ninth segment pale. Male hypopygium with the ninth tergite extensive, pale, with a deep and narrow V-shaped median notch, the broad lateral lobes irregularly notched and toothed, the most lateral tooth largest. Ninth pleurite complete, the pleural appendages being long and slender; outer appendage cylindrical, clothed with long, coarse yellow hairs; inner appendage with the posterior margin beautifully fringed with long flattened hairs. Ninth sternite with the caudal inner angle with a pale, roughly oval lobe which is covered with a pale appressed pubescence and whose ventral angle bears a pencil of long reddish hairs that are decussate with those of the opposite side across the genital chamber. Eighth sternite bearing a broad, flattened, heart-shaped median lobe that is provided with long, coarse, yellow hairs.

Habitat.—Argentina.

Holotype, ♂, Province of Buenos Aires (C. Bruch).

Paratopotypes, 2 ♂♂.

Tipula bruchi is named in honor of Señor Charles Bruch, to whom I am indebted for many favors. The species agrees fairly well with the description of *T. nubifera* van der Wulp, but the pattern of the thorax and wings is very different in the two species.

Tipula wittei new species.

Antennal flagellum indistinctly bicolorous; mesonotum dark gray with five brown stripes, the three intermediate stripes capillary, the lateral stripes broader; wings grayish, the stigma pale yellowish brown; abdominal tergites brownish yellow with three dark brown stripes.

Female.—Length, about 26 mm.; wing, 19.2 mm.

Frontal prolongation of the head pale brownish yellow, more pruinose above; palpi dark brown. Antennæ with the first segment gray pruinose; second segment yellow; flagellar segments with the basal enlargement dark brown, the remainder of each segment a trifle paler to produce a very indistinct bicolorous effect; flagellar verticils long. Head brownish gray with a very indistinct brown line on the vertical tubercle.

Pronotum brownish with an indistinct capillary dark brown median line. Mesonotal præscutum dark gray with five brown stripes, the three intermediate very narrow, being formed by the lateral margins and capillary median vitta of the usual broad median stripe; lateral stripes broad; humeral region yellow; præscutal interspaces with a few dark setigerous punctures; scutum dark gray; scutellum dark testaceous brown; postnotum light gray with a capillary black median line. Pleura light yellow, gray pruinose; dorsopleural membranes dull yellow. Halteres long, dark brown, the base of the stem paler. Legs with the coxæ pale reddish, sparsely gray pruinose; trochanters dull yellow; femora reddish brown, the tips indistinctly darker; tibiæ yellowish brown, the tips narrowly dark brown; metatarsi yellowish brown, the tips darkened; remainder of the tarsi dark brown; metatarsi shorter than the tibiæ; claws small, simple. Wings grayish, the apical cells grayish brown, the costal and subcostal cells more yellowish; stigma pale yellowish brown; an obliterative streak before and beyond the stigma, the latter in the bases of cells R_2 and R_3 . Venation: Cell R_2 rather broad at the base; basal deflection of R_{4+5} short; cell 1st M_2 small, almost regularly pentagonal; petiole of cell M_1 short, about as long as cell 1st M_2 ; *m-cu* punctiform.

Abdominal tergites brownish yellow with three broad dark brown stripes, the lateral margins of the segments rather broadly pale, the caudal margins indistinctly ringed with yellowish, most evident on segments six and seven; sternites pale yellow, the terminal segments indistinctly pruinose. Ovipositor with the long dorsal shield and the valves light chestnut brown, the straight, slender tergal valves greatly exceeding the sternal valves, along the ventral margin with scattered erect setæ.

Habitat.—Argentina (Patagonia).

Holotype, ♀, Valle Tunel, Santa Cruz (Dr. Witte).

Tipula philippiana new species.

Antennæ indistinctly bicolorous; mesonotal præscutum dark brown with three broad bluish gray stripes that are narrowly and incompletely margined with pale gray and dark brown; pleura with a broad brown dorsal stripe; wings white, sparsely streaked with brown, the costal and subcostal cells more yellowish; abdomen dull yellow, trivittate with dark brown.

Female.—Length, about 23 mm.; wing, 19.5 mm.

Frontal prolongation of the head reddish testaceous; palpi dark brown. Antennæ with the basal flagellar segments indistinctly bicolorous, the basal swelling brown, the terminal flagellar segments more unicolorous brown; ver-

ticles conspicuous. Head light gray, more brownish adjoining the inner margin of the eyes.

Mesonotal præscutum dark brown, the præscutum stripes clear bluish gray, margined with dull whitish gray; the median stripe is split by a capillary dark brown line that broadens out behind, just before the suture enlarging into a blotch; immediately laterad of this and occupying the præscutal interspaces a similar short brownish line extending from the suture cephalad; interspaces sparsely dotted with brown setigerous punctures; lateral margins of the median stripe at about midlength of the sclerite narrowly and indistinctly margined with brown; lateral margins and the humeral region of the dark brown ground color; scutum dull gray, the lobes with a linear dark brown stripe; median lobe of the scutellum and the postnotum gray pruinose, the latter with an indistinct brown median line. Pleura brown, grayish pruinose; a dark brown longitudinal stripe on the dorsal pleurites; a dark brown velvety spot immediately dorsad of the base of the halteres on the sides of the postnotum and a small white area immediately before the halteres; dorso-pleural membranes dull yellowish. Halteres dark brown, the base of the stem and the base of the knob paler. Legs with the coxæ pale, grayish pruinose; trochanters and femora dull brownish yellow, the latter with an indistinct brownish ring immediately before their apices; tibiæ yellowish brown, the tips darker; tarsi brown; metatarsi considerably shorter than the tibiæ. Wings white, sparsely streaked and lined with brown; cells *C* and *Sc* strongly yellowish; stigma brown; small dark brown marks at *h*, at the origin of *Rs*, midway between the two latter, and at the tip of *Sc*; larger but slightly paler clouds at the fork of *Rs*, connecting with the stigmal spot, a large blotch in the end of cell *R*₂ and the middle of cell *R*₃; a large blotch at the base of cells *R* and *M* and along vein *Cu* in cells *M* and *Cu* for almost the whole length of this vein; grayish clouds in the ends of the anal cells; the ends of veins *M*₁, *M*₂, *M*₃, *Cu*₁ and 1st *A* are seamed with brown. Venation: Base of cell *R*₂ broad; cell 1st *M*₂ subpentagonal; *m-cu* obliterated by the fusion of *Cu*₁ on *M*₃₊₄; cells *R*₃ and *M*₁ are somewhat broader than in *T. wittei*.

Abdomen with the first tergite gray pruinose; remaining tergites dull yellow with three diffuse dark brown stripes that almost obliterate the ground color except at the base of the sclerites; sternites dull yellow, sparsely pruinose. Ovipositor almost as in *T. wittei* but the dorsal basal shield less elongate.

Habitat.—Argentina (Patagonia).

Holotype, ♀, Valle Tunel, Santa Cruz (Dr. Witte).

COLEOPTERA COLLECTED AT SCHOHARIE, N. Y.,
JUNE 9-14, 1918, WITH DESCRIPTIONS OF
NEW SPECIES.

BY HOWARD NOTMAN,

BROOKLYN, N. Y.

CICINDELIDÆ.

Cicindela sexguttata Fabr. (1)

CARABIDÆ.

Omophron americanum Dej. (16)

Omophron tessellatum Say. (3)

Elaphrus ruscarius Say. (4)

Nebria pallipes Say. (2)

Dyschirius sphaericollis Say. (5)

Dyschirius aureolus n. sp.

Schizogenius lineolatus Say. (6)

Bembidium inæquale Say. (6)

Bembidium chalceum Dej. (3)

Bembidium nigrum Say. (12)

Bembidium planiusculum Mann. (7)

These specimens are indistinguishable from specimens collected in the Bitter Root Mountains of Montana and agree with the description of the species.

Bembidium planum Hald. (7)

Bembidium picipes Kby. (16)

Bembidium postremum Say. (2)

Bembidium oberthüri Hayw. (19)

Bembidium patruale Dej. (18)

Bembidium posticum Hald. (5)

Bembidium versicolor Lec. (4)

Bembidium quadrimaculatum Linn. (2)

Tachys scitulus Lec. (5)

Tachys corruscus Lec. (1)

- Tachys laevis* Say. (2)
- Tachys flavicauda* Say. (1)
- Tachys tripunctatus* Say. (2)
- Tachys vivax* Lec. (3)
- Tachys incurvus* Say. (18)
- Patrobus longicornis* Say. (1)
- Pterostichus lucublandus* Say. (9)
- Pterostichus luctuosus* Dej. (1)
- Pterostichus corvinus* Dej. (1)
- Pterostichus mutus* Say. (2)
- Amara angustata* Say. (2)
- Amara impuncticollis* Say. (1)
- Amara obesa* Say. (4)
- Dicælus dilatatus* Say. (1)
- Dicælus elongatus* Bon. (1)
- Dicælus teter* Bon. (2)
- Badister notatus* Hald. (1)
- Calathus gregarius* Say. (3)
- Platynus cincticollis* Say. (4)
- Platynus extensicollis* Say. (5)
- Platynus anchomenoides* Rand. (2)
- Platynus cupripennis* Say. (1)
- Lebia viridis* Say. (1)
- Brachynus janthinipennis* Dej. (1)
- Brachynus minutus* Harr. (1)
- Brachynus cyanipennis* Say. (2)
- Brachynus gracilis* Blatch. (1)
- Brachynus ballistarius* Lec. (1)
- Brachynus fumans* Fabr. (1)
- Brachynus cordicollis* Dej. (5)
- Chlænium sericeus* Forst. (6)
- Chlænium tricolor* Dej. (2)
- Brachylobus lithophilus* Say. (1)
- Agonoderus comma* Fabr. (7)
- Harpalus pennsylvanicus* DeG. (5)
- Harpalus herbivagus* Say. (1)
- Bradycellus rupestris* Say. (1)
- Anisodactylus rusticus* Say. (1)

Anisodactylus discoideus Dej. (2)

Anisodactylus interstitialis Say. (1)

DYTISCIDÆ.

Laccophilus maculosus Germ. (1)

Calambus dissimilis G. & H. (1)

Agabus semivittatus Lec. (1)

GYRINIDÆ.

Dineutes discolor Aubé. (12)

HYDROPHILIDÆ.

Helophorus lineatus Say. (31)

Helophorus inquinatus Mann. (3)

Laccobius agilis Rand. (2)

Cymbiodyta lacustris Lec. (1)

Cercyon ocellatum Say. (1)

Cercyon unipunctum Linn. (1)

SILPHIDÆ.

Hydnobius laticeps n. sp.

SCYDMÆNIDÆ.

Euconnus fatus Lec. (1)

PSELAPHIDÆ.

Tyrus humeralis Aubé. (1)

STAPHYLINIDÆ.

Tachyusa cavicollis Lec. (9)

Atheta palustris Kies. (11)

Atheta dentata Bern. (1)

Myllæna vulpina Bern. (1)

Staphylinus badipes Lec. (1)

Philonthus fusiformis Mels. (1)

Philonthus viridanus Horn. (2)

- Actobius sobrinus* Er. (1)
- Actobius fulvicornis* n. sp.
- Actobius pæderoides* Lec. (6)
- Actobius terminalis* Lec. (1)
- Baptolinus americanus* Csy. (1)
- Stenus bipunctatus* Er. (4)
- Stenus venustus* Csy. (1)
- Stenus morio* Grav. (2)
- Stenus flavicornis* Er. (4)
- Cryptobium bicolor* Grav. (4)
- Scopæus quadriceps* n. sp.
- Medon corticinus* Grav. (1)
- Medon ochraceus* Grav. (1)
- Pæderus littorarius* Grav. (4)
- Conosoma crassum* Grav. (1)
- Bledius stabilis* Csy. (1)
- Bledius emarginatus* Say. (4)
- Bledius honestus* Csy. (1)
- Trogophlæus morio* Er. (2)
- Geodromicus nigrinus* Müll. (4)

TRICHOPTERYGIDÆ.

- Pteryx duvalii* Matth. (1)
- Trichopteryx sericans* Heer. (2)
- Trichopteryx discolor* Hald. (1)
- Trichopteryx haldemani* Lec. (2)

SCAPHIDIIDÆ.

- Scaphidium piceum* Mels.

PHALACRIDÆ.

- Stilbus obtusus* Lec. (1)
- Stilbus atomarius* Linn. (5)

COCCINELLIDÆ.

- Coccinella 9-notata* Hrbst. (1)
- Coccinella trifasciata* Linn. (1)

- Psyllobora 20-maculata* Say. (5)
Brachyacantha ursina Fabr. (1)
Brachyacantha 10-pustulata Mels. (1)
Scymnus fraternus Lec. (1)
Scymnus puncticollis Lec. (1)
Scymnus tenebrosus Muls. (1)

COLYDIIDÆ.

- Cerylon castaneum* Say. (1)

CUCUJIDÆ.

- Læmophlæus adustus* Lec. (1)

CRYPTOPHAGIDÆ.

- Tomarus pulchellus* Lec. (5)
Agathengis lineola n. sp.
Atomaria ovalis Csy. (1)
Atomaria pusilla Schön. (1)
Atomaria oblongula Csy. (4)
Atomaria ochracea Zimm. var. *pennsylvanica* Csy. (2)
Atomaria ephippiata Zimm. (3)

DERMESTIDÆ.

- Anthrenus scrophulariæ* Linn. (1)
Anthrenus museorum Linn. (1)
Anthrenus castaneæ Mels. (1)

HISTERIDÆ.

- Hister merdarius* Hoffm. (1)

NITIDULIDÆ.

- Brachypterus urticæ* Fabr. (26)
Heterostomus mordelloides n. sp.
Omosita colon Linn. (3)

LATHRIDIIDÆ.

- Lathridius liratus* Lec. (2)
Cartodere argus Rtttr. (1)

- Corticaria elongata* Gyll. (1)
Melanophthalma picta Lec. (1)
Melanophthalma distinguenda Com. (5)
Melanophthalma pumila Lec. (3)

BYRRHIDÆ.

- Limnichus punctatus* Lec. (1)

GEORYSSIDÆ.

- Georyssus pusillus* Lec. (3)

PARNIDÆ.

- Psephenus lecontei* Lec. (10)
Dryops lithophilus Germ. (1)
Elmis latiusculus Lec. (1)
Stenelmis linearis Zimm. (9)
Stenelmis sinuatus Lec. (2)
Stenelmis crenatus Say. (5)
Stenelmis 4-maculatus Horn. (2)

HETEROCERIDÆ.

- Heterocerus tristis* Mann. (1)

DASCYLLIDÆ.

- Ectopria nervosa* Mels. (46)
Cyphon obscurus Guér. (5)
Cyphon variabilis Thunb. (1)

ELATERIDÆ.

- Hypnoidus abbreviatus* Say. (1)
Ædostethus femoralis Lec. (2)
Elater socer Lec. (1)
Elater areolatus Say. (1)
Glyphonyx recticollis Say. (1)
Æstodes tenuicollis Rand. (3)
Melanotus divarcarinus Blatch. (1)

- Limoniinus æger* Lec. (1)
Ludius (Corymbites) exilis n. sp.
Ludius hieroglyphicus Say. (2)
Ludius inflatus Say. (2)
Oxygonus obesus Say. (2)
Asaphes decoloratus Say. (1)

THROSCIDÆ.

- Throscus constrictor* Say. (1)

BUPRESTIDÆ.

- Dicerca lurida* Fabr. (2)
Anthaxia viridicornis Say. (1)
Anthaxia quercata Fabr. (1)
Agrilus otiosus Say. (1)
Agrilus masculinus Horn. (1)
Agrilus arcuatus Say. (1)
Agrilus politus Say. (1)
Agrilus obscuro-guttatus Gory. (1)
Agrilus lacustris Lec. (4)
Agrilus egenus Gory. (2)
Brachys ærosa Mels. (14)

LAMPYRIDÆ.

- Calopteron reticulatum* Fabr. (1)
Lucidota punctata Lec. (6)
Photinus consanguineus Lec. (4)
Photinus pyralis Lec. (1)
Photinus marginellus Lec. (1)
Photuris pennsylvanica DeG. (10)
Podabrus rugulosus Lec. (1)
Podabrus basillaris Say. (2)
Podabrus brunnicollis Fabr. (2)
Telephorus dentiger Lec. (2)
Telephorus fraxini Say. (1)
Telephorus vilis Lec. (2)
Telephorus carolinus Fabr. (2)

- Telephorus nigrutilus* Lec. (2)
Telephorus flavipes Lec. (2)
Telephorus rotundicollis Say. (3)
Telephorus tuberculatus Lec. (1)
Malthodes spado Lec. (2)
Malthodes fragilis Lec. (1)

MALACHIIDÆ.

- Pseudebæus oblitus* Lec. (4)
Pseudebæus pusillus Say. (2)
Attalus pallifrons Mots. (1)

CLERIDÆ.

- Clerus thoracicus* Oliv. (2)
Hydnocera verticalis Say. (1)
Hydnocera longicollis Ziegl. (13)

PTINIDÆ.

- Hadrobregmus carinatus* Say. (2)

CIOIDÆ.

- Cis punctatus* Mellié. (1)

LUCANIDÆ.

- Dorcus parallelus* Say. (1)

SCARABÆIDÆ.

- Aphodius ruricola* Mels. (1)
Aphodius granarius Linn. (1)
Hoplia modesta Hald. (1)
Dichelonycha diluta Fall. (1)
Xyloryctes satyrus Fabr. (1)
Cremastochilus canaliculatus Kby. (2)
Trichius piger Fabr. (2)
Trichius affinis Gory. (1)

CERAMBYCIDÆ.

- Callimoxys sanguinicollis* Oliv. (1)
Cyrtophorus verrucosus Oliv. (2)
Eudercus picipes Fabr. (8)
Encyclops cæruleus Say. (2)
Pachyta monticola Rand. (1)
Gaurotes cyanipennis Say. (13)
Leptura lineola Say. (8)
Leptura exigua Newm. (4)
Leptura pubera Say. (4)
Leptura vibex Newm. (1)
Leptura mutabilis Newm. (5)
Saperda lateralis Fabr. (1)
Oberea basalis Lec. (1)

CHRYSOMELIDÆ.

- Lema trilineata* Oliv. (1)
Anomæa laticlavata Forst. (1)
Coscinoptera dominicana Fabr. (1)
Babia quadriguttata Oliv. (1)
Xanthonia io-notata Say. (1)
Xanthonia villosula Mels. (1)
Rhabdopterus picipes Oliv. (3)
Nodonota puncticollis Say. (16)
Labidomera clivicollis Kby. (2)
Calligrapha philadelphica Linn. (2)
Calligrapha bigsbyana Kby. (7)
Gastroidea polygoni Linn. (1)
Phyllodecta vitellina Linn. (2)
Cerotoma trifurcata Forst. (4)
Luperodes thoracicus Mels. (7)
Luperodes meraca Say. (1)
Diabrotica vittata Fabr. (2)
Galerucella cavicollis Lec. (4)
Galerucella decora Say. (1)
Disonycha xanthomelana Dalm. (1)
Haltica ignita Ill. (8)
Crepidodera rufipes Linn. (12)

- Crepidodera helxines* Linn. (7)
- Epitrix cucumeris* Harr. (6)
- Orthaltica copalina* Fabr. (13)
- Systema hudsonias* Forst. (8)
- Systema taniata* Say. (1)
- Longitarsus pygmaeus* Horn. (1)
- Phyllotreta amoraciae* Koch. (1)
- Chaetocnema confinis* Cr. (1)
- Dibolia borealis* Chev. (3)
- Chalepus dorsalis* Thunb. (1)
- Chalepus rubra* Web. (1)

CISTELIDÆ.

- Isomira quadristriata* Coup. (1)
- Mycetochares binotata* Say. (1)

LAGRIIDÆ.

- Arthromacra ænea* Say. (3)

MELANDRYIDÆ.

- Canifa pallipes* Mels. (1)

CEPHALOIDÆ.

- Cephaloön lepturides* Newm. (2)

MORDELLIDÆ.

- Anaspis nigra* Hald. (6)
- Anaspis rufa* Say. (16)
- Mordella marginata* Mels. (3)
- Mordellistena biplagiata* Helm. (1)
- Mordellistena aspersa* Mels. (4)

ANTHICIDÆ.

- Corphyra lugubris* Say. (8)
- Macratria confusa* Lec. (12)
- Notoxus anchora* Hentz. (1)
- Anthicus obscurus* Laf. (4)

MELOIDÆ.

Macrobasis unicolor Kby. (2)

Pomphopæa sayi Lec. (3)

CURCULIONIDÆ.

Polydrusus americanus Gyll. (1)

Sitona hispidula Fabr. (1)

Apion griseum Smith. (45)

Apion atripes Smith. (1)

Apion turbulentum Smith. (1)

Apion porcatum Boh. (1)

Phytonomus meles Fabr. (6)

Phytonomus nigrirostris Fabr. (1)

Lixus crassulus n. sp.

Tanysphyrus lemnae Fabr. (1)

Otidocephalus chevrolatii Horn. (2)

Orchestes ephippiatus Say. (1)

Tychius picirostris Fabr. (13)

Cryptorhynchus lapathi Linn. (2)

Psomus politus Cay. (1)

Cæliodes flavicauda Boh. (6)

Ceutorhynchus punctiger Sahl. (3)

Ceutorhynchus puberulus Lec. (1)

Pelenomus asperulus Dietz. (1)

Rhinoncus pyrrhopus Boh. (1)

Limnobaris rectirostris Lec. (1)

Sphenophorus zeæ Walsh. (1)

Dryophthorus americanus Bedel. (5)

Stenoscelis brevis Boh. (1)

Records in Other Orders.

HYMENOPTERA.

MUTILLIDÆ.

Sphærophthalma simillima Smith. (1)

ICHNEUMONIDÆ.

Exochus semirufus Cress. (1)

Thalessa atrata Fabr. (1)

DIPTERA.

MYCETOPHILIDÆ.

Mycetobia divergens Walk. (1)

STRATIOMYIDÆ.

Sargus viridis Say. (1)

Macrosargus clavis Will. (1)

Stratiomyia discalis Lw. (1)

SYRPHIDÆ.

Pyrophana granditarsus Forst. (1)

LEPIDOPTERA.

AGAPETIDÆ.

Cissia eurytus Fabr. (1)

HESPERIIDÆ.

Ancyloxypha numitor Fabr. (1) (identified by F. E. Watson, A.
M. N. H.)

Epargyreus tityrus Fabr. (2)

HEMIPTERA.

PENTATOMIDÆ.

Nezara hilaris Say. (1)

ARADIDÆ.

Aneurys inconstans Uhl (1)

TINGIDIDÆ.

Corythuca arcuata Say. (1)

MIRIDÆ.

Plagiognathus politus Uhl. (1)

CICADIDÆ.

Okanagana canadensis Prov. (1) (identified by W. T. Davis)

MEMBRACIDÆ.

Cyrtolobus van Say. (1)*Publilia concava* Say. (2)

ORTHOPTERA.

BLATTIDÆ.

Ischnoptera pennsylvanica DeG.*Ischnoptera uhleriana* Sauss. (1)

ACRIDIDÆ.

Paratettix cucullatus Burm. (7)*Tettix granulatus* Kby. (1)*Tettix granulatus* Kby., v. *variegatus* Hanc. (1)

ODONATA.

AGRIONIDÆ.

Argia putrida Hagen. (26)

This species was very abundant in a dry, sunny hillside road, several hundred feet above Schoharie Creek.

Amphiagrion saucium Burm. (3)

ÆSCHNIDÆ.

Gomphus quadricolor Walsh.*Ophiogomphus carolus* Needh. (2)

These specimens were captured in a dry hillside road.

Dromogomphus spinosus Selys. (1)

MECOPTERA.

PANORPIDÆ.

Panorpa rufescens Ramb. (3)

DESCRIPTIONS OF NEW SPECIES.

Dyschirius aureolus new species.

Form elongate, convex, subcylindrical. Color black with gold-bronze lustre; antennæ, mouth parts and legs dark rufo-piceous; basal joint of the antennæ paler. Head, omitting the mandibles, as broad as long, as wide as the thorax at apex; eyes large, very convex, front with a distinct transverse

impression between the eyes; clypeus emarginate, feebly bidentate; occiput smooth, impunctate. Thorax slightly longer than wide, widest a little behind the middle; sides in front nearly straight and slightly convergent, posteriorly rather strongly convergent and slightly arcuate. Elytra at base very slightly wider than the thorax, widest at the middle, twice as long as wide, two and one half times as long as the thorax; sides evenly and feebly arcuate from base to the semicircularly rounded apex; base not margined; striae strong, entire, rather finely and distantly punctured on basal half, indistinct and evanescent posteriorly; the third stria bipunctate, anterior puncture a little before the middle, posterior at apical one third. Length, 4-4.25 mm.; width, 1-1.25 mm. 2 ♂.

In LeConte's table of the genus, this species would be placed with *sphaericollis*, from which it is distinguished by its smaller size, slightly elongate thorax with the sides in front nearly parallel. *D. edentulus* Putz. also placed with *sphaericollis*, is a large species, 7 mm. in length, with impunctate third elytral interval and the striae obliterated posteriorly.

Hydnobius laticeps new species.

Form oblong oval, strongly convex. Color uniform rufo-testaceous. Head broad, finely and sparsely punctate, labrum bilobed. Thorax twice as wide as long, scarcely narrower at apex than at base, widest at middle, sides evenly but not strongly arcuate; distinctly and rather sparsely punctate. Elytra oval, rather oblong; sides gradually narrowed and arcuate from base to apex; sutural stria obsolete at base, gradually more strongly impressed to the apex where it approaches the margin; surface with rows of rather coarse and closely placed punctures, very feebly impressed; intervals with more or less irregularly placed punctures of equal size. Body beneath not distinctly punctured. Length, 2 mm.; width, 1 mm. 1 ♂.

Male.—Anterior and middle tarsi not distinctly dilated, posterior femora with a rather broad tooth, obliquely truncate at apex; posterior tibiae, straight, rather strongly dilated at apex.

Female.—Unknown.

This species may be distinguished from *substriatus* and *latidens* by its large head and thorax not distinctly narrowed in front and by the shorter tooth of the posterior femora and the more strongly dilated tibiae.

Actobius fulvicornis new species.

Form slender, elongate, parallel, subdepressed. Color black, elytra piceous brown, indefinitely darker on the suture and basal third; antennae, mouth parts

and legs reddish yellow. Head omitting the mandibles as long as broad, as wide as the thorax, punctures rather coarse, sparse and somewhat indistinct; antennæ as long as the head and thorax, joints five to ten strongly transverse, eight and nine twice as wide as long, the others not so wide. Thorax one fourth longer than wide; sides parallel; posterior angles strongly rounded, anterior angles obtuse and very narrowly rounded; punctate like the head, a distinct row either side of the middle, elsewhere sparse and irregularly placed. Elytra one fourth wider than the thorax, slightly wider at apex than at base, nearly one third longer than wide, surface shining, more coarsely, closely and distinctly punctate than the head and thorax. Abdomen gradually wider to the fifth segment where it is as wide as the elytra; sides scarcely arcuate; rather sparsely and very finely punctate; pubescence long even and rather coarse; beneath more distinctly punctured. Length, 4 mm.; .75 mm. 1 ♀.

Male.—Unknown.

Female.—Terminal abdominal segment broadly rounded; anterior tarsi not distinctly dilated.

A. semipunctatus F. & G. is the only species listed from North America or Europe which the above at all resembles. The antennæ in that species are described as short, "barely reaching the middle of the thorax" and the outer joints "quite transverse." The antennæ and legs are differently colored. *A. semipunctatus* is not included in the Junk Catalogus.

Scopæus quadriceps new species.

Form rather slender, parallel, somewhat depressed. Head and elytra rufopiceous, the latter paler at apex, abdomen darker, blackish; thorax, antennæ, palpi and legs dull rufo-testaceous. Head one fifth longer than wide; neck one fifth the width of the head; the latter behind the eyes, square; base straight, posterior angles moderately rounded; eyes distant from the base two and one half times their diameters; antennæ very nearly as long as the head and thorax, outer joints subquadrate; gular sutures moderately separated, straight and parallel; head finely, densely and evenly punctate. Thorax very slightly narrower than the head, one fourth longer than wide; anterior angles at apical third, sides thence straight and very slightly convergent to the round posterior angles; a little less densely punctate than the head with a narrow median smooth line. Elytra scarcely wider than the thorax, equal to or narrower than the head; the head, thorax and elytra subequal, if anything the head being the widest. Elytra one fourth longer than wide, less than one fourth longer than the thorax, a little more coarsely and less densely punctate than the head. Abdomen very slightly wider to the apical margin of the fourth segment where it is slightly wider than the head. First joint of the posterior tarsi longer than the second but shorter than the second and third together, two, three and four equal, as long as wide. Length, 2.3 mm.; width, .35 mm. 1 ♀.

Male.—Unknown.

Female.—Anterior tarsi scarcely dilated, sixth ventral segment broadly triangular at apex.

This species seems closely related to *S. macilentus* Csy. (Rev. N. Am. Pæderini, 1905, p. 208). It is distinguished by the elytra not wider than the head, more elongate thorax with the anterior angles farther removed from the apex.

Agathengis lineola new species.

Form very elongate, moderately convex. Head and thorax black, beneath dark piceous; elytra brownish yellow, two nubilous dark spots on each elytron on basal half near the suture, the posterior spot larger and elongate; antennæ and legs rufo-testaceous. Head rather sparsely and not coarsely punctate; front between the antennæ sharply but obtusely angulate; antennæ more widely separated from each other at base than from the eyes; first joint equal in length to the next three; fifth joint elongate, nearly twice as long as wide; club joints not distinctly transverse. Thorax one fourth wider than long, strongly impressed from side to side at the basal margin, not foveate laterally; sides feebly arcuate and convergent from basal fourth to the apex, a little more strongly convergent to the basal angles which are obtuse but distinct; coarsely, evenly and somewhat closely punctate. Elytra twice as long as wide, not more than one sixth wider than the thorax; sides evenly arcuate from base to apex, a little more strongly on apical third; humeri minutely denticulate; scutellum more than twice as wide as long; punctuation not quite so coarse and distinct as that of the thorax on the basal half, evanescent at the apex. Pubescence rather short, fine and appressed. First ventral segment at middle equal in length to the following two. Length, 1.3–1.4 mm.; width, .35–.45 mm. (2.)

This species is distinguished from those hitherto described by its more elongate form and proportionately narrower elytra.

Heterostomus mordelloides new species.

Form oval, very convex, slightly compressed and narrowed posteriorly. Color black, scarcely shining; antennæ, mouth parts and legs dark rufous, posterior femora and tibiæ darker, nearly black. Surface rather coarsely, very densely and uniformly punctured; scutellum with the posterior half of its side margins, smooth, shining and impunctate. Head slightly less than one half as wide as the thorax, antennæ subcapitate, club elongate; joints one and two subequal, globular, three elongate, nearly as long as the next two, ten twice as wide as long. Thorax three fifths wider than long, male; three fourths, female; apex a little more than one half the width of the base, strongly emarginate and bisinuate, sides parallel in basal half, strongly arcuate in apical half; anterior angles acute, posterior sharply rectangular, strongly produced; base trisinuate, median sinuation less marked, disk evenly and strongly convex, slightly impressed either side at the basal margin. Intercostal process of the

prosternum narrow, not dilated nor elevated at tip, coarsely and densely pubescent posteriorly. Elytra conjointly a little transverse, apex truncate, apices separately broadly rounded; humeri slightly prominent; elytra not margined, epipleuræ indistinct; scutellum arcuate-triangular, apex distinct. Abdomen with two dorsal segments exposed second and third ventral segments very short, combined not as long as the first, fourth or fifth, the latter the longest. Middle and posterior legs compressed; tibiæ strongly dilated at apex with a dense fringe of equal spinules. Tarsi dilated and spongiose beneath; second and third joints emarginate; claws appendiculate. Length, 2.6-2.75 mm.; width, 1.25-1.45 mm. 1 ♂, 1 ♀.

(♂—Keene Valley, Essex Co., N. Y., 28 June, 1918.)

Male.—Additional abdominal segment visible from above.

This species seems closely allied to the European *H. pulicarius* Linn. In the latter the punctuation of the head and propygidium are said to be evidently ("merklich") finer. (Gangl. Käf. Mitt.-Eu., Vol. III (II), p. 455.) In *mordelloides* the punctuation of the head is not at all finer and that of the propygidium only very slightly finer.

The genus *Heterostomus* has not been reported hitherto from North America. In Dr. Horn's table of the Brachypterini, it would be placed as follows:

Claws distinctly toothed at base.

Prosternum elevated at tip; elytral epipleuræ distinct.....*Brachypterus*

Prosternum not elevated at tip; elytral epipleuræ indistinct...*Heterostomus*

Claws simple or nearly so.

(*Cercus*, *Amartus*, *Anthonus*.)

Ludius (*Corymbites*) *exilis* new species.

Form very elongate, elytra subdepressed. Head, thorax and underside plumbeous black, elytra ochreous yellow; base and underside of the first antennal joint, mandibles, labrum and prosternal lobe rufous, anterior angles of the thorax narrowly and obscurely rufescent; posterior angles and narrow basal margin and the legs rufo-testaceous. Head concave and unmargined at middle in front; punctures above coarse, close and umbilicate; antennæ strongly serrate, the second joint very short, scarcely longer than wide, third joint triangular, similar to the fourth, terminal joint constricted near the apex. Thorax as wide as the head at apex, about three fourths longer than wide, sides parallel, rounded anteriorly near the angles, posterior angles produced, strongly divaricate and distinctly carinate; strongly sulcate on the median line, sulcus not attaining the anterior margin, indistinct impression on the lateral declivities; punctures coarse, dense and umbilicate on the sides, finer and sparser on the disk. Elytra very slightly wider than the thorax, sides parallel to the middle, thence very gradually and evenly attenuate to the apex; striæ fine, not distinctly punctate, intervals slightly convex, rugulose and finely and

sparsely punctate. Pubescence short, sparse and pale. Scutellum elongate, obtuse at apex, closely and finely punctate. First joint of the posterior tarsi a little longer than the second. Length, 13.5 mm.; width, 3.5 mm. (1.)

This species is closely allied to *L. fulvipes* Bland. In addition to the differences in color, it may be distinguished by the more elongate and parallel-sided thorax with the anterior angles rounded and narrowly depressed and the more strongly divaricate posterior angles and by the elytra distinctly wider.

In the latest classification of the Elateridae by Schwarz in *Genera Insectorum*, *Ludius* Esch. is used in place of *Corymbites*, *Limonius*, etc., a change justified by the fact that *Corymbites* Latr. was defined to include only the species with semi-pectinate antennae in the male, and that *Ludius* Esch., an older genus, is defined to include species with unmargined front, simple claws, unlobed tarsi and narrow coxal plates.

Lixus crassulus new species.

Form elongate, cylindrical, moderately slender. Color black, shining, antennae and tarsi picescent. Pubescence short, scale-like, yellowish, more dense on the sides. Head and beak finely and rather densely punctate, a deep rounded fovea between the eyes and a short stria between the antennae; beak cylindrical, as long as the head and thorax, strongly arcuate; antennae inserted at apical two fifths, scape not as long as the remaining joints; first two joints of the funicular, elongate, subequal, second as long as the following two. Thorax one third wider than long; sides rather strongly arcuate and convergent from base to a little more than apical one fourth where they are rather strongly constricted; apex one half the width of the base; disk impressed, impression wider and deeper at the base; finely and densely punctured; sides of the impression coarsely rugose-punctate at base, a few coarse punctures on the apical half. Elytra slightly wider than the thorax and three and one half times as long; sides parallel to apical third and thence obliquely rounded to the conjointly rounded apex; a rather deep scutellar impression; surface very finely and indistinctly punctulate with rows of coarse, well separated punctures, becoming smaller apically. Length, 13.5 mm.; width, 4.5 mm. 1 ♀.

This species is distinguished from *L. concavus* Say by its slightly broader form, wider thorax with sides more strongly rounded and constricted and the much less numerous coarse punctures on the apical half of the disk.

THE INSECTS OF THE EVENING PRIMROSES IN NEW JERSEY.

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The observations recorded in this paper were made in various parts of New Jersey on the evening primroses which are commonly and as will be shown later, incorrectly known as *Oenothera biennis* L., and probably such additional species as *oakesiana* and *cleistantha*. Most of the work was done during the season of 1919 and it might be added that it was carried on incidental to regular duties of an inspection nature.

Oenothera, according to Bailey's Standard Cyclopedia of Horticulture is said to be Greek for wine-scenting in allusion to an ancient use of the roots. The *oenotheras* are mostly dry soil plants and are chiefly North American. In a letter Dr. George H. Shull writes, as follows: "The true *Oenothera biennis* L. has not been found in America but is very widely distributed in Europe. It is generally understood of course that all of the *oenotheras* are of American origin but that this particular species has no known native American habitat, which probably means, merely that the American *oenotheras* are still only very imperfectly known. The number of species occurring in America and formerly included under the name *biennis* in the manuals is very large. I have not the least doubt that when the *Oenothera* species of the eastern United States are fully known taxonomically, there will be hundreds of them."

¹ In this paper, therefore, the term evening primrose should be taken to mean in the main, those species commonly known and grouped together under the name *biennis*. These species are mostly biennial and make only a rosette of leaves during the first year. According to Stone (Plants of Southern New Jersey, N. J. St. Mus. Rept., 1910) dry, open ground is preferred. They are common in the northern, middle and coast districts south to Cape May, being largely weeds in waste places and cultivated ground. In this character they are occasionally found in the pine barrens. Flowers occur from late June into October and fruits from late July through autumn.

Before taking up the accounts of the insects associated with the evening primroses, it will not be out of place to call attention to a paper by Alice Adelaide Knox on "The Relation of Injury to Fasciation in the Evening Primroses," which appeared in *The Plant World* (Vol. 10, No. 7, July, 1907). Parts of this paper are quoted below.

"Examination of species of *Oenothera* by cutting or splitting the axes, reveals within many of them comparatively large numbers of the larvæ of a small moth named *Mompha*, which subsist on the pith toward the end of summer, and winter in the hollow stem. Some of the larvæ develop in the ovary and emerge in the winged state from the ripened capsule. Still others hatch in the leafy tip of the flowering stalk or in the rosette, and in the latter bind together the leaves to make a protective covering and feed in its heart during the cold months. In each case the eggs are laid in the growing region, so that the initial meristem is subject to injury from the ovipositor. In the last instance large mutilations may be caused by the devastations of the feeding, and such ravages account for the frequent abortion of the main axis among the fasciated plants. On the other hand many plants remain unaffected, for the new leaves furnish sufficient food, the larva does not penetrate the center of the axis, and never reaches the meristem. In still a third case the meristem may be barely touched or irritated, and the injury may be a one in its effects similar to those caused by the ovipositor. Where the wound is inflicted by the mouth parts of the larva it is ordinarily more easily detected than when made by the ovipositor of the imago, for it frequently interferes with procambial development in such a way that the bundle ring is symmetrical, or there is a conspicuous callus formation, or other signs are evident, by which its course may be traced and its origin ascertained. When the tissues are pierced by the ovipositor the injury is so small that it is impossible to find it after any considerable amount of growth has occurred. A comparatively deep incision measures 1.25 mm. in longitudinal section; it disappears almost immediately upon the consequent enlargement of the surrounding cells, and it is useless to look for traces of it at advanced stages of development. Fasciated tips so young that their flattened character can only be determined microscopically show wounds in the meristem at the apices, but as the banding of the stem becomes conspicuous, all traces of the disturbance are gradually

lost. The time of the attack makes a great difference in the development. If the injury is to a growing region of a biennial plant still in the rosette stage, the plant fasciates during the rosette period, and the growing region becomes linear before the time of the elongation. The stems are then flat from the base. If the plant is adult at the time of the invasion the injuries are in the upper part of the stems which have already completed their first growth. These fasciated stems are round below and flat above. In a given field of plants it will also be noticed that most of the fasciated individuals begin to flatten from the same relative point on the axis. This seems to indicate that the banding is stimulated in all of them at the time of the advent of the new swarm, or its less penetrating mode of attack may account for the absence of any degree of fasciation whatever.

"The importance of conditions of culture correlates well with the above observations and the character of the environment is significant in the production of the fasciation in two ways: namely, in providing a favorable habitat for the insect, and in promoting vigor in the individual plant, such that it will recover from, and not succumb to, the mutilations. Degrees of moisture, isolation, and light all influence the activities of the insect as well as the development of the plant itself. Healthy plants may be more attractive to the insects; damp or rainy weather may drive the insects into the flowering heads, or under the young leaves; isolated plants in full sunlight may be better exposed for the hatching of the eggs. An entomological study of the habits of these animals would be of interest in this connection, and would throw light on the exact relation of the insect's life-history to the life-history of the plant. There always remains the further necessity that the plant shall be 'susceptible,' but we are assured by de Vries that the degree of susceptibility of the normal and flourishing primrose is superior to that of the ailing plant, and that the physiological responses of the two are not alike."

Without attempting to explain the relation of insect injury to fasciation in these plants, we wish to state that the "*Mompha*" referred to by Miss Knox consists of several distinct species, which confine their attacks almost exclusively to certain parts of the plant; also that these insects belong to the Lepidoptera, the members of which do not possess a true ovipositor and that the eggs of these

species are laid as the case may be, on the stem, leaves, and developing tips and buds and not inserted in the tissue. In view of this we do not see how the initial meristem could be injured by the ovipositor. It would be possible, however, for the larva of the species breeding in the tip to injure this tissue by feeding. During the past summer, hundreds of infested plants were examined in various parts of New Jersey and the amount of visible fasciation found was very small. It therefore appears to us as if the primrose insects do not play such an important part in fasciation as Miss Knox's paper would indicate.

The following species of insects were found associated with the primroses during the second year of their growth, or in other words, with the adult plants. As a rule little was found on the rosettes. The tip moth, *Phalonia Enotherana*, winters over in the rosette, as will be shown later and it is quite probable that some of the leaf feeders utilize this stage of the plant for food purposes. The rosettes also should afford hibernation quarters for miscellaneous species. Primrose roots were examined and with one exception the results were negative. This exception consisted of aphids which were found on roots at Hightstown, N. J., by Mr. West. Unfortunately no specimens were saved and the identity of the species is unknown to us.

LEPIDOPTERA.

Rhodophora florida Gn.

This prettily colored moth is one of the species intimately associated with the evening primrose, the larva feeding on the unopened buds and to a much lesser extent, the seed capsules and the adults visiting the flowers by night and resting within the partially closed blossoms during the day. It has been considered an apparently rare insect by collectors until the characteristic habits of the larva or adult were known when it became an obviously common species within the limits of its distribution.

The Flowery Primrose Moth was the popular name used by Dr. Asa Fitch (12th Rept. Nox. Ben. Ins. St. N. Y., pp. 900-906) as the title of a paper in which he gives a very complete account of the life-history and habits of the insect. The species was described by Guenée in 1857 (Hist. Nat. Ins. Lep., Vol. VI, p. 71) from a single female taken in New York by Mr. Edward Doubleday while collect-

ing in that state in 1837. Since its original description it has been noted in various lists and papers, notably by Fitch (*loc. cit.*), by Saunders (Can. Ent., Vol. 2, p. 6, 1869) (Can. Ent., Vol. 3, p. 76, 1871), who studied it in Ontario, Canada, and by Smith (Brook. Bul., IV, p. 28, 1881).

The insect is apparently confined to the eastern part of North America ranging from Canada south through the Atlantic States. Saunders records it from Ontario in July. Winn records it from Montreal and other places in Quebec, July, August (Prel. List Ins. Quebec Lep.); Dyar's List gives Atlantic States and Smith (Ins. N. J.) throughout New Jersey, July, August. In the latter state where our own observations have been made, we have collected it in a number of localities from mid July until mid August. We have also collected it in Connecticut and Mr. W. T. Davis records it from Staten Island in July and August.

The larva destroys or injures many blossoms by its characteristic feeding habit of "boring a round hole in the bud" of sufficient size to admit its head which it sinks downward farther and farther, eating through the folded mass of petals, nearly or quite cutting them asunder and severing also the stamens and pistil." Thus when the flower comes to burst forth from its bud at the close of the day, it is but half its normal size and presents a most rueful aspect with the outer end of its petals gnawed and ragged, and all the beauty of their natural appearance destroyed." (Fitch, *l. c.*). Foliage may also be eaten to a slight extent.

The following descriptions of the different stages and life history notes have been taken from the papers already referred to and from our own observations in the field.

Egg.—"Length one fortieth of an inch; width one forty-fifth. Form nearly round, flattened a little at the base, where it is also somewhat contracted in size, and slightly conical above, with numerous raised striæ, about 36 in all, which run into each other before they reach the tip, where they are reduced to less than half the number, and terminate at the base of a small ring which crowns the tip: this ring has a depression in the center, and the space around the cavity is finely punctured. The striæ are irregularly crossed by numerous fine, raised lines, and thus the whole surface is minutely reticulated, but the meshes are irregular in form, with a

slight depression in the center of each. The color of the egg is dull yellowish pink" (Saunders).

Young Larva.—"Length about one fifteenth of an inch, cylindrical. Head large and black, with a few black and brown hairs. Body above of a dull shining yellow, with a wide dorsal band of dull white. On each segment there are from eight to twelve shining black dots, from each of which arises a single black or brown hair. The upper portions of second and terminal segments have each a large patch of black. Under surface similar to the upper, but with fewer dots; feet black; prolegs pale greenish, faintly tipped with brown" (Saunders).

Full-Grown Larva.—"Cylindrical, tapering slightly at each end and one inch in length, when crawling elongating itself to 1.15, and 0.18 thick. It is clothed with fine, shortish, scattered hairs which are placed symmetrically. Its ground color is pale green, of a yellowish or apple green tint when full grown, but usually pea green when it is smaller. Along the middle of its back is a stripe of a deeper grass green color, and a similar one upon each side of the back. These three stripes extend from the neck to the middle of the penultimate segment. Each of the lateral stripes has a dull cherry red spot at its anterior end, placed on each side of the middle of the neck or first ring, and in rare instances the anterior ends of these lateral stripes are of this color for a short distance. Before it is full grown the lateral stripes are sometimes faint or wholly wanting; and low down on each side is an elevated fold of the skin which forms a faint stripe of a paler color than the ground. The head is a third narrower than the neck and is held obliquely downward and forward. It is slightly paler than the body and is clothed with fine erect hairs.

"A variety of the larva occurs, of a dull pale brownish yellow color, with the stripe olive or dull brownish green. In one instance a young larva 0.60 long was observed wholly destitute of the red spots upon the neck" (Fitch).

Adult.—*Rhodophora florida*. This was described by M. A. Guenée (l. c.), whose description follows: "32 mm. Ailes supér, ayant la côte et les deux premiers tiers de leur surface d'un rose vif, et le dernier tiers, ainsi que la frange, d'un jaune-ochracé uni: le tout sans taches ni lignes. Ailes infer. blanches teintées d'ochracé. Des-

sous des quatre ailes ochracé, avec la côte rosé, sans autre dessin: Corps ochracé en dessus et rose en dessous.

"Etat de New Yorck. Coll. Dbday. Une female."

The eggs are laid singly, usually on the outside of the bud midway between the base and the tip, but the location may vary and they may occur on the inner side or elsewhere on the bud, on the outer side of blossoms at base, on upper surface of leaf (none noted on lower surface), on the stem or even on the seed capsules and as many as four have been noted on a single bud. Material collected at Nutley, N. J., on July 23 was examined and the following numbers of eggs and young larvæ were found on various "heads" or short shoots,—4 e., 1 l.; 1 l.; 5 e., 2 l.; 4 e., 1 l.; 2 e.; 2 e., 1 l.; 6 e., 1 l.; 2 e., 3 l.; 1 e., 3 l.; 2 e.; 3 e.; 8 e. These were found for the most part on the buds.

As the adults emerge irregularly during the summer, apparently fresh specimens being found from early July to mid August, eggs will be found during about this same period and in early or mid August, eggs and various stages of larvæ may be found on one plant at the same time. In about three days time the young larvæ emerge from the eggs and begin feeding on the buds. The habit of the larva of making a hole into the inside of the bud has already been referred to. If all of the bud were eaten not many would be needed to bring the larva to maturity, but its tendencies are wasteful and many buds and some seed capsules may be injured before its development has been completed. Resting as it feeds with the exposed portion of its body resting longitudinally on the bud and being somewhat protectively colored, it may be easily overlooked.

About a month is required for the larva to mature and so they may be found on the plants from middle July to late September. When full grown they enter the ground at the base of the plant to remain until the following season. While they feed singly they show little tendency to wander and Dr. Fitch notes that the larvæ will enter the soil of even a hard trodden walk of a garden rather than seek softer soil at a greater distance.

The adults are inactive during the day and are found resting on the flowers within the partially closed petals. From this position one is easily captured and it was in this way that a considerable series of specimens was obtained in various parts of New Jersey.

This moth, like many other species, is attracted to light. The first specimen seen by Dr. Fitch in 1858 was brought to him from Adam, Mass., where it was taken at light and four years later he captured a second specimen at light in his own home in New York state.

We have not bred any specimens and find no record of parasitic enemies in the literature relating to this species. *Triphleps insidiosus*, a common predaceous hemipteron, however, was observed feeding on the egg of this species. The lancets of the beak were inserted in the side of the egg, the tip of the beak scarcely penetrating the covering and in this position it rested for thirty minutes. The egg gradually collapsed on one side and then the base cracked open, the contents having been practically exhausted.

Desmia funeralis Hubn.

This species, known as the grape leaf-folder, has long been recognized as a pest of the vine. It is widely distributed in the United States and probably occurs in nearly every locality where wild or cultivated grapes grow. At first its occurrence on primrose at Princeton Junction, N. J., appeared somewhat unusual, but when it was later found on the same plant at Monmouth Junction and in fairly large numbers at Washington's Crossing, N. J., we concluded that the primrose could be included in its short list of recorded food plants.

In view of the fact that the grape leaf-folder has been known to entomologists in this country since 1855 and has been treated in various publications, it is not necessary to go into details here concerning its life-history and habits. Therefore the following account except where its occurrence is mentioned in connection with evening primrose, has been drawn from what appears to be the latest publication on this insect by J. F. Strauss.¹

It was first noted by us in New Jersey at Princeton Junction on July 2, when small and almost full grown larvæ were taken from the foliage of evening primrose. The young larvæ were found feeding on leaves which had not been folded, while the older ones were always within a folded or rather rolled leaf. The leaves were rolled either from the tip back or lengthwise up or down and the larvæ fed within the cylinder either on the upper or lower epidermis, de-

¹ The Grape Leaf-Folder, Bul. 419, U. S. D. A., Bur. Ent.

pending on the way the leaf was rolled. Sometimes the entire tissue was eaten. Strauss makes no mention of the leaf-rolling habit in connection with its injury to grape foliage in the east, but according to Quayle,² in California the leaf is distinctly rolled and not folded over on the upper surface and fastened down by strands of silk as it is in the east. In addition Quayle states that the free edge is consumed. On primrose in New Jersey both the free edge and the inner surface of the rolled leaf were eaten.

During the first week of July our specimens became full grown and each pupated in a cocoon formed by the cutting of the leaf in two places from the midrib to the edge and the folding of this flap over to the opposite edge of the leaf. About twelve days were required for the pupal stage, the first moths issuing on July 18. According to Strauss, the full-grown first brood larvæ leave their shelters on grape and drop to the ground where they transform among the fallen leaves, trash, etc., and in exceptional cases a larva may web several leaves together and pupate within or it may pupate within the folded leaf where it has fed. The pupæ of the second brood are also found among dead leaves and hibernation takes place in this stage.

Unfortunately the second brood pupæ on primrose were not observed, and it is not known whether a cocoon is made or not. A second brood undoubtedly occurs in New Jersey because adults were found during the middle of July and larvæ during August. From the foregoing it is apparent that the habits of the larvæ vary considerably within certain limits. In addition to wild and cultivated grapes, other recorded food plants are Virginia creeper and redbud. The following brief descriptions are adapted from Strauss.

Egg.—Length 0.7 mm., elliptical, membranous chorion presenting under high magnification, delicate, hexagonal markings.

Full Grown Larva.—Length about 1 inch; widest in middle and tapering toward either end; glossy, translucent yellow green on sides and somewhat darker above, with scattered, fine, yellow hairs on each segment; the head and prothoracic shield are light brown and there are light brown spots on the sides of the first two thoracic segments.

² Quayle, H. J., Bul. 192, Cal. Agric. Exp. Sta.

Adult.—*Desmia funeralis*.

Pyralis funeralis Hubn., *Pyral. f.*, 103, 1796.

Anania funeralis Hubn., *Verz. Schm.*, 360, 3449.

Botys bicolor ? Swain., *Zoöl. Illustr.*, II, pl. 77, 1821-2.

Desmia maculatis Westw., *Mag. Zoöl. Class*, IX, pl. 2, 1832.

Desmia funeralis (Hubn.) Guen., *Delt. et Pyral.*, No. 124, p. 190, 1854.

Expanded the wings of the moth measure about nine tenths of an inch. They are very dark brown with an opalescent or silvery reflection and border with white. In both sexes the forewings have two nearly oval, white spots. The hind wings of the male bear one spot, which may be divided in the female. The body is black crossed by two white bands in the female and by one band in the male.

Strauss reared seven species of hymenopterous and three species of dipterous parasites from the larvæ and pupæ of *Desmia funeralis* and an account of these together with a bibliography of 26 titles can be found in his publication.

Celerio lineata Fabr.

This well-known species is known to feed on purslane, buckwheat, turnip, watermelon, chickweed, dock, apple, currant, grape, gooseberry and evening primrose according to Beutenmuller (*Amer. Mus. Nat. His. Guide Leaflet No. 10*, 1903) and is recorded by Smith (*Ins. N. J.*, *N. J. St. Mus. Rept.*, 1909) as being common throughout New Jersey, July to November.

During the summer of 1919 it was abundant at Princeton on evening primrose being grown for experimental purposes, but appeared to be rare on this plant in other parts of the state. During the 1918 season, it was found on primrose at Nutley, N. J. According to Mary C. Dickerson (*Moths and Butterflies*, 1901) the caterpillars are three inches long and vary greatly in coloring and markings. There appears to be two kinds, one being yellowish green with a series of connected spots along each side of the back, each spot being colored crimson, yellow and black, the other being black with a yellow line down the middle of the back and yellow spots of various sizes along the sides. These two styles may vary in many ways. Pupation takes place in the soil, this stage hibernating.

The moth is a beautiful one, known as the White Lined Sphinx. Two broods occur, the first appearing during June and July and the second during the latter part of August and early in September.

Apantesis arge Dru.

Forbes (23d Rept. St. Ent. Ill., 1905, p. 75) states that this is especially a southern species reported many years ago as destructive to Indian corn in the southern states. In addition to corn it is known to feed upon plantain, smartweed, dock, cactus, lamb's quarters and evening primrose. According to Forbes the species is double brooded, passing the winter in the latitude of Illinois as a partly grown larva and changing to a pupa in March and April of the following year. After a pupal period of 15 days the moths emerge and lay eggs until late in May. These hatch in 15 days, producing a second brood of caterpillars in the middle of June and the pupæ from these are formed early in July. Late in July and early in August the moths appear after a 20-day pupal period and deposit eggs which in September produce the hibernating brood of caterpillars.

Smith (Insects of New Jersey, N. J. St. Mus. Rept., 1909) records it from Sussex to Cape May counties, reporting that Mr. Grossbeck found eggs at Paterson May 5, larvæ from May 18 to June 20, feeding on grass, plantain, *Chenopodium*, *Polygonum* and other low plants. Edwards (Bul. 35, U. S. Nat. Mus.) gives numerous references to this species and lists *O. biennis* as the food plant.

Euthisanotia unio Hubn.

This species, known as the Pearl Wood-nymph, is also recorded as a feeder on evening primrose and grape, although Saunders (Insects Injurious to Fruits, p. 261) states that the larva of this species closely resembles that of *Euthisanotia grata*, long known as a grape feeder, and that Dr. Fitch, who first announced grape as a food plant of *E. unio*, may have mistaken the larva of *grata* for *unio*. Smith (Insects of New Jersey) states that *E. unio* occurs throughout the state, locally, more or less abundant, June and July, the larvæ being found on evening primrose and *Epilobium*. Beutenmuller (Annals N. Y. Acad. Sci., V, March, 1890) furnished these food plants for Smith's List. Edwards (Bul. 35, U. S. Nat. Mus.) gives numerous references to this species and mentions *vitis* as the food plant.

Phalonia œnotherana Riley.

This gayly colored member of the Tortricidæ was described by Riley in 1881 (Tr. St. Louis Acad. Sci., IV, 316) from four specimens bred from *œnothëra* in Missouri by Miss Murtfeldt. Smith (Ins. N. J.) lists it from Essex County, VII, 25 (Kf.), and Clementon, IV, 30 (Haim.), together with the statement, "larva on evening primrose." In addition to these localities we have found it at Woodbury, Highland Park, Hackensack, Riverton, Monmouth Junction, West End and Asbury Park. The larva lives in the tender, developing, leafy tip of the stalk, pulling the small leaves together more or less.

Egg.—Not observed.

Full Grown Larva.—Length 6.8 mm. Width 1.7 mm. Light tawny yellow, not elongate, comparatively broad; surface finely shagreened; divisions between segments and transverse lines on dorsal surfaces of segments usually strongly impressed; each body segment bearing several, comparatively long hairs, with dark or light tuberculate bases; head similar in color to body except spot around which ocelli are clustered and apical portion which are darker (in some specimens entire head is dark brown); thoracic and anal plates brownish or light; each leg bearing several minute hairs.

Pupa.—Length 5.5 mm. Width 1.6 mm. Elliptical, chestnut brown.

Adult.—*Phalonia œnotherana*. The following is the original description by Riley: "Male and female. Expanse 9–10 mm. Basal half of primaries yellow, apical half rose-red. Head gray. Thorax yellow, the patagia tipped with gray: primaries with the basal half yellow, the costa and apical half rose-red, the yellow extending as a broad median emargination into the red; the red portion more or less dotted or fasciate with black shining scales, these scales not encroaching upon a central patch which contains a yellow spot of variable size; some abbreviated black and white costal streaks; posterior margin and fringes yellow, becoming gray at the anal angle; secondaries and under surfaces fuscous; legs silvery, the tibiæ and tarsi mostly black or fuscous. Abdomen silvery-fuscous, paler beneath; ovipositor laterally compressed."

This species appears early in the season and evidently deposits eggs on the developing terminal leaves or heads. The larvæ eat out

a central cavity and pull the small leaves together. When full grown, about the last week in June, each constructs a rather dense, whitish cocoon and anchors it to a partly folded over section of a leaf, usually near the tip. Moths emerge during the last of June and first part of July and full-grown larvæ are again in evidence during the last half of August.

About September 15 moths again appear and probably deposit eggs on the tips of the rosettes as Mr. West discovered at Hackensack, N. J., on November 5, very small, half-grown and several full-grown larvæ at the bases of the young leaves in the centers of large rosettes. These leaves showed evidence of feeding and some of the larvæ had webbed up the tender foliage somewhat. Others were encased in loosely spun cocoons in the fold of a leaf. It is thus evident that overwintering takes place in the partly to full grown larval stages in the rosette.

On June 20 at Riverton, N. J., *Cremastus epagoges* Cush. (identified by R. A. Cushman) was bred from the larva and on July 10 at the same locality *Actia pilipennis* Fall. (identified by J. M. Aldrich). At Red Bank, N. J., August 8, *Tachniphyto anea* Coq. (det. J. M. Aldrich) was bred from the larva.

Mompha eloisella Clem.

This is a common and widespread species which was described by Clemens in 1860 (Proc. Acad. Nat. Sci. Phil., 171, 1860). Winn (Lep. Quebec) lists it from Montreal VI (W.) and Rosemere VI (W.) in the pith of evening primrose. Smith (Insects of New Jersey) records it as occurring throughout New Jersey, the larva in the stalks of evening primrose throughout the winter and states that pupation takes place in late May, the adults issuing in June.

This is the most abundant of all the species of *Mompha* associated with the evening primrose and occurs at practically every place in New Jersey where its food plant grows. The larvæ develop in the stems and overwinter in the dried stalks.

Egg.—Length, 0.41 mm. Width 0.27 mm. Oval, translucent, chorion with interrupted, somewhat irregular, longitudinal ridges.

Full Grown Larva.—Length 13 mm. Width 0.17 mm. Yellowish white; elongate; segmentation distinct; constriction between segments prominent; head light reddish brown, irregularly mottled;

each body segment bearing a few minute, fine hairs, the dorsal ones being equidistant, more prominent and forming a transverse row; hairs more numerous on anal segment, head and legs; hooks of anal prolegs forming an apparently continuous, straight or slightly curved line.

Pupa.—Length 5.8 mm. Width 1.5 mm. Reddish-brown; seventh abdominal segment tuberculate laterally; last abdominal segment terminating in two dorsally pointed tubercles, each of which bears a posteriorly pointed, smaller tubercle below it; each abdominal segment bears a couple of hairs on the side.

Adult.—*Mompha eloisella*. In Dyar's Catalogue, the following synonyms are noted: *magnatella* Zeller, *anotheracella* Chambers, and *lyonetiella* Chambers. Clemens's description of this species follows: "Head, face and thorax silvery white, the latter spotted with blackish. Labial palpi white with a dark brown spot on the middle of second joint and two dark brown rings on the third one at the base and one at tip. Antennæ tawny yellow, white at base. Forewings silvery white with a small tuft of tawny scales at the basal joint of the third fold and a larger patch of the same hue on the inner margin at the end of and above the fold. Between the tufts in an oblique dark brown costal streak nearly joined at an angle by another of the same hue in the middle of the wing and exterior to the first tuft is a blackish brown streak which becomes diffuse behind the above while the apical portion of the costa midway between these latter is a rather faint dark spot. Cilia yellowish gray. Hind wings tawny grayish, cilia ochreous."

As has been stated, this species overwinters in the larval stage in cells in the stalks of evening primrose. Most of these cells are found in the main stem, but the side shoots which arise near the ground are often infested. The lateral shoots near the top or middle of the stem are evidently too small to afford suitable quarters. These cells occur in all parts of the main stem except the extreme tip and in most cases except the lower portion. The first twelve inches of stem above the ground and in some cases more is very often taken up with the channels, excrement, etc., of *Tyloderma foveolatum*, which bred there during the summer and as a rule *eloisella* cells are scarce in this section.

The cells may be close together in a stem or far apart and the

number ranges from one or two to as many as thirty or more. Sometimes the entire pith of the stem is taken up by them and each cell contains a larva. Only in rare cases have two been noted in a single cell. Cells varied in length from 9 to 30 mm., in the same stem and the width was 3.5 mm., this being the width of the pith. The width of the cells depends on the diameter of the pith as they are never found in the woody part. In one or two cases cells were found which occupied only one half of the diameter of the pith. The cells in side shoots are usually long because the diameters of such shoots are small and those of the pith comparatively smaller. Each cell consists of a cavity in the pith which is plugged at each end with what appears to consist of dark excrement-like material, in layers, closely packed together, each layer being intermixed with threads. The cell is usually but not always lined inside with a thin layer of silk.

The yellowish larvæ in the stems varied considerably in size, some being rather small, but most of them appeared to be full grown or nearly so. Central stems, three and one half high, were found to contain larvæ as follows: 2, 1, 6, 2, 2, 3. Stems from four to five feet high housed the following: 4, 9, 5, 4, 3, 3, 4, 7, 1, 7, 14, 20, 10, 8, 18, 11, 8, 12, 16, 4, 9, 5, 8. In a few instances stems six feet long contained as many as thirty or more.

During April and May the larva spins a rather loose and roomy cocoon which fills a considerable portion of a small cell. After this is completed the larva cuts a circular hole through the wall of the upper part of the cell, usually close to the roof, almost to the outside, leaving only the thin epidermis which is found on the outside of the stem. The large, loose, roomy cocoon connects with this circular hole. After this the larva spins a compact, white, elongate cocoon in which it transforms, this cocoon also connecting at its upper end with the circular opening through the cell wall. These cocoons are usually placed more or less diagonally in the cells and are anchored to the large, loose cocoon by threads. Sometimes, however, the larger cocoon is absent.

Pupation takes place during the last of May and continues until the middle of June and in the central part of the state, the first moths emerged on June 4. In the northern part, however, pupation and emergence take place later. In fact, pupation and emergence take

place during all of June and the first half of July. However, the moths which emerged on July 15 were in all probability stragglers as the majority appeared during June. The first eggs were noted on June 23. Under laboratory conditions these were laid on the upper leaf surfaces and hatched in about one week. In the field they are probably deposited on the stems in addition to the leaves. After hatching the larvæ enter the stem tissue and feed, making longitudinal cavities just under the bark and between the bark and pith. At this time the larva is greenish and except for the head, which is light brown, resembles the tissue in which it feeds. During the last of July and first of August and before they are full grown, they start to excavate the pith and construct a cell. By the time cool weather arrives, all are in their completed, hibernation cells at which time they are of a decidedly yellowish color.

The following parasites of *eloisella* can be noted:

Scambus inquisitoriellus (Dalla Torre). Reared from larvæ feeding externally on *eloisella* larvæ. (Hymen. Conn., p. 321.)

Chelonus lavernæ Ash. Parasitic on *Mompha eloisella* (Smith, Ins. N. J., p. 612). Also bred from *eloisella* larvæ, Riverton, N. J., June 12 (det. R. A. Cushman).

Eurytoma sp. Emerged March 22, New Brunswick, N. J., from cells of *eloisella*. Numerous (det. R. A. Cushman).

Epiurus pterophori Ash. Emerged from cells of *eloisella* collected at New Brunswick and Morristown, N. J. Very abundant. Emerged in laboratory from middle of March to middle of April.

Microbracon sp. from *eloisella* cells (det. Cushman).

Pimpla inquisitor Say. According to Weed in Insect Life (Vol. 3, p. 275), the larva of this species is externally parasitic upon *eloisella* larvæ.

At Lakehurst, N. J., on April 4, *eloisella* cells were collected which contained numerous clusters of the mite *Pediculoides ventricosus* N. together with dried larval skins of *eloisella*. Later this mite made its appearance in our breeding cages and killed many of the larvæ. (Mite det. by Dr. Nathan Banks.)

Mompha stellerella Busck.

This insect was described by Busck in 1906 (Canad. Ent., Vol. 38, p. 123) from Pennsylvania and District of Columbia specimens and

the larvæ recorded by him as feeding in the bases of the flowers of evening primrose. Winn (Lep. Quebec) states that it occurs at Montreal, Canada, September 10, the food of the larvæ being the seed capsules of evening primrose. It is not recorded by Smith in his "Insects of New Jersey," and this seems strange in view of the fact that we have found this species to be generally distributed over New Jersey, the larvæ living in the flower buds and causing them to swell conspicuously.

Egg.—Length 0.42 mm. Width 0.26 mm. Oval, yellowish-white, translucent, larva showing through transparent chorion which is apparently smooth.

Full Grown Larva.—Length 10 mm. Width 1.7 mm. Elongate, cylindrical, tapering slightly anteriorly and more so posteriorly. Ground color light yellow. All body segments broadly, transversely banded with pink, this band being not so apparent on anterior segments because of it being more diffused. Pink coloration varies considerably and in some specimens is barely visible so that the larva has a light creamy-yellow appearance. Head brown, somewhat mottled and variable in intensity, dark around the margins. Ocelli lateral, six in number, grouped around a dark center. Head and each body segment bears a few minute hairs, some of which are arranged in a more or less transverse row. Head bears several long hairs. Cervical shield brown, covering much of middle portion of dorsal surface of prothorax, front margin straight, posterior margin rounded, divided longitudinally in center.

Pupa.—Length 5.5 mm. Width 1.6 mm. Elliptical, smooth, chestnut-brown.

Adult.—*Mompha stellella*. Busck's description follows: "Antennæ unicolored, dark brown. Labial palpi whitish ochreous, sprinkled with black scales and with a black annulation just before the tip of terminal joint. Face silvery white. Head and thorax light ochreous, mottled with brown and black scales, costal edge evenly mottled with black and entire apical part of wing sprinkled with sparse black scales, two oblique, ill-defined and indistinct shades of light brown stretch across the wing, one from the base, the other from the middle of costa. There are six tufts of raised ochreous scales in two longitudinal rows, one through the middle of the wing, the other below the fold. The central of the latter tufts which is

found just before the tornus is the largest of them and is terminated by and followed by intense black scales, the most conspicuous marking on the rather evenly mottled wing. Abdomen ochreous. Legs ochreous, mottled with black. Alar expanse 11-12 mm. . . . It is nearest and quite similar to the other *Cenothera* feeder, *Mompha brevivitella* Clemens, but lacks the longitudinal black streaks on the fore-wings and is at once recognized by the black tornal patch."

This species appears when the green flower buds have just started to develop and deposits eggs on them and on the tips of the small leaves surrounding the buds. The larvæ feed on the outside for a short time and then enter the buds. Larvæ were found in buds ranging in size or rather length from 3 to 9 mm. The first feeding inside the bud is near the tip, but the larva soon works downward and feeds on the style and stigma, the stamens and the inner folded parts of the petals. As a result, the bud swells. As development continues, the upper portion of the swollen, closed bud becomes filled with excrement. Sometimes the inner part of the green calyx is eaten out. As a rule, a bud contains only one larva.

When full grown, the larva cuts a small round hole about 1 mm. in diameter in one side of the bud and crawls out, finally dropping to the ground where it constructs an elongate, white cocoon, either on top of or slightly beneath the surface. Particles of soil, etc., are fastened and adhere to the outer surface so that the cocoon is effectively hidden.

Full-grown larvæ can be found in New Jersey during the last half of July and most of August, but during the last of August they become scarce, having left many of the buds by this time. During the last half of August and first part of September, the pupæ are plentiful and the adults issue from the middle of August to the middle of September, a few stragglers even emerging as late as the first few days of October. Part of the brood may overwinter in the cocoons.

On August 27, adults of *Bassus gibbosus* (Say) and *Microbracon mellitor* (Say) (det. R. A. Cushman) were bred from larvæ collected at Riverton, N. J., both being larval parasites of *stellitea*. On several occasions adults of *M. mellitor* were observed ovipositing in the buds of primrose.

Mompha circumscriptella Zell.

This species was described by Zeller from Texas specimens in 1873 (Verh. Zool.-bot. Ges. Wien., xxiii, 312, 1873). Chambers (Can. Ent., X, 239, 1878) writes of Texas specimens having been received from Miss Murtfeldt, who informed him that the larvæ fed upon the immature seeds of *Oenothera* and pupated within the capsules. Smith (Ins. N. J.) records it from Anglesea, N. J., August 30, rare, the larva in the seed capsules of evening primrose.

The species is really not so rare in New Jersey provided one looks for it. We have found it occurring at New Brunswick, Bound Brook and Egg Harbor. The larva lives in the seed capsules, confining its feeding to the seeds in a few of the compartments and destroying only from one fourth to one third of the seeds in a single capsule.

Egg.—Not observed.

Full Grown Larva.—Length 5.7 mm. Width 1 mm. Subcylindrical; whitish; head dark brown; on either side of front of head is a light band, meeting on apex; ocelli lateral near ventral margin of head, seven, arranged in a ring; each segment beginning laterad of the ventral surface bears a row of fine hairs, equidistant but not in a straight line; on head, first body segment and legs are several fine hairs; in partly grown larvæ last body segment shows a dorsal, dark anal plate which is lighter and hardly apparent in older larvæ.

Pupa.—Length 3.8 mm. Width 1.1 mm. Shape similar to that of other micro-pupæ; reddish-brown with middle portion of abdomen slightly lighter; dorsal surface of anal segment bears two minute tubercles.

Adult.—*Mompha circumscriptella*. Chambers (Can. Ent., X, 239, 1878), in writing of this species, gives the following description and remarks: "I have not seen Prof. Zeller's specimens, but I have received from Miss Murtfeldt specimens which, with the aid of Prof. Zeller's figure and description, I recognize without difficulty as belonging to this species. The thorax, head and palpi are white, except that the basal part of the second joint of the palpi is stained with brownish. The fore wings are of a pale grayish ochreous, with the dorsal margin from the base nearly to the middle snowy white, the white crossing the fold at the base, and further back again crossing the fold and reaching almost to the costal margin; it is

margined behind by two small tufts of raised brown scales, as represented in Zeller's figures, and there is another one on the costa not represented in the figure, which again has a minute brown spot in the white at about the basal fourth, which I do not find in my specimens. The figure also gives a very distinct white streak which leaves the white of the dorsal margin at the fold and curves to the costal margin before the ciliæ; this streak is absent in one of my specimens and much less distinct in the other than it is in the figure. There is a black speck at the hinder angles (indistinct in my specimens) and the apex is dusted indistinctly with brown. Al. ex. $5\frac{1}{2}$ lines."

It is not known just how this species passes the winter nor how early it appears in New Jersey. On August 4, primrose seed capsules collected at Egg Harbor, N. J., which is in the southern part of the state, were found to contain small and medium sized larvæ. These appeared to have entered the seed capsule at its distal end in the depressed part, although from the character of the injury it seemed as if some had entered the base of the capsule close to the stem.

Some capsules contained two larvæ, but one was the rule. In most cases the larva had confined its attention to the immature seeds in only one or two compartments, such compartments being filled with partly eaten seeds and excrement. Upon reaching maturity, which takes place usually during the last three weeks of August, the larva spins a whitish, elongate cocoon within the capsule compartment where it has been feeding, attaching the upper end to the inner side of the outer wall. These cocoons are covered with reddish-brown particles of excrement and are somewhat cigar-shaped. Either after or before spinning the cocoon the larva cuts a circular hole almost to the outside of the capsule. This opening leads to the upper end of the cocoon which is fastened over it and is covered only with a thin film of tissue, which breaks readily and allows the pupa to protrude slightly so as to facilitate the emergence of the adult.

The exit holes are usually found in the upper half of the seed capsules. From material collected in the southern part of the state we secured adults from the seventh to the last of August. It is likely that all of the moths emerge before cool weather because many of the seed capsules split during September and October and allow

the seeds to fall. Numerous seed capsules examined during the winter were found to contain only the empty cocoons and pupal shells. From this it appears that the adults hibernate. In the spring and early summer, no trace of this species was found. Its habits prior to the appearance of the seed capsules are therefore unknown to us. It is quite probable that the first brood develops in the immature flower buds.

A species of *Microbracon*, which Mr. Cushman states requires further study, was bred from the dry seed capsule.

OTHER SPECIES OF *MOMPHA* ASSOCIATED WITH EVENING PRIMROSE.

Mompha brevittella Clem.

syn. *anotherivorella* Chambers.

syn. *anotheraseminella* Chambers.

Chambers described this species in 1864 in the genus *Wilsonia* (Proc. Ent. Soc. Phil., II, 428, 1864). Smith (Ins. N. J.) lists it from Lucaston, October 18 (Dke.), and states that the larva lives in the seed capsules of evening primrose, also that the species is probably generally distributed. According to Dyar's Catalogue it occurs in the Atlantic States.

In our work with primrose insects this species was bred from seed capsules collected at Rutherford, Oradell, Tenafly and Springfield, N. J., the adults issuing during the last of August and first part of September.

Mompha murtfeldtella Chambers.

syn. *albocapitella* Cham.

syn. *grissælla*, Cham.

syn. *obscurusella* Cham.

syn. *parvicristatella* Cham.

This was described by Chambers in 1875 (Cinn. Quar. Jn. Sci., Vol. II, p. 237) from a specimen received from Professor Riley and Miss Murtfeldt. In the Canadian Entomologist for 1879, Vol. XI, p. 6, Chambers gives the following information about the habits of this species: "Miss Murtfeldt favors me with the following notes upon the larva of this species: Feeds upon the flowers of *œnotheras* both wild and cultivated and is especially destructive to *O. missouriensis*. Eggs laid singly on sticky surface of calyx and larvæ as soon

as hatched make their way to the center of the bud and feed on petals and stamens. Full grown larva is about one quarter of an inch in length, cylindrical, tapering slightly posteriorly and anteriorly. When young it is of a dull, brownish green color, gradually assuming a reddish tint until at maturity the sides are of a deep dull pink arranged in wavy shaded stripes, which are more intense on the subdorsal spaces. Head oblique, round, pale glossy grayish brown with the dark brown mandibles and the triangular face outlined with the same color. Cervical collar entirely covering top of first segment, of glossy dark grayish brown marked on dorsum with a narrow but distinct longitudinal line of white. Anal plate brown and horny. Legs and prolegs well developed. Pupates in dense, tough yellowish cocoon on the surface of the ground. Moths issue in about ten days. There are at least two distinct broods in a season, the second of which hibernates in cocoons."

We did not find this species in New Jersey and Mr. August Busck suggests that it may not occur this far north.

COLEOPTERA.

Tyloderma foveolata Say.

Of the insects associated with the evening primrose, the weevil *Tyloderma foveolata* Say is one of the commonest and most widely distributed. This species was described by Say in 1831 (Desc. N. A. Curc., p. 19, Lec., ed. I, p. 284), since when its occurrence on the evening primrose has been recorded at various times. Webster briefly mentions (Ins. Life, Vol. 2, p. 11, 1890) the habits of the insect especially in regard to oviposition while Girault (Ent. News, Vol. XXII, p. 112, 1911) gave a further and more detailed account of the insect as he observed it in Illinois. The writers have had it under observation in New Jersey for the past few years and the account here given is a result of their observations as well as those in the papers noted.

The species is widely distributed in the eastern part of the country. Blatchley and Leng (Rhyn. N. E. Amer., 1916) state that it "ranges from New England to Nebraska and south to Florida." Smith (Ins. N. J. St. Mus. Rept., 1909) reports it as occurring throughout New Jersey, May, June, and in our observations we have found it to be more or less common wherever the primrose grows.

It is said to breed in willow herb (*Epilobium* sp.) as well as the

evening primrose although we have no definite records nor have we observed this plant to be infested with it. All of our observations have been made on the evening primrose. The insect hibernates as an adult, both sexes living through the winter, as the beetles have been noted in copulation during the spring and early summer. Blatchley and Leng (*loc. cit.*) state that it hibernates beneath boards and rubbish and Mr. Stafford obtained two specimens while sifting material in the grass along the edge of a peach orchard at Vineland, N. J., March 1.

As soon as the weather becomes sufficiently warm in the spring the insects leave their hibernation quarters and after feeding and mating, the females oviposit. Most of the egg punctures occur on the main stem of the plant, but a number of them may be found on the branches. The number occurring on this latter place depends on the size of the plant and the amount of oviposition. The seed capsules also serve as a place for oviposition at times and even the underside of the leaf petiole is utilized although it is questionable whether any of the eggs located in the latter situation produce adults.

The egg scar consists of an oval area of which the surface tissue at both ends has been pulled back in fine strips and pressed down over the egg which is located in a cavity at the center of the scar. These threads or strips are of a considerable number. They are not drawn back parallel with the stem but some are drawn more or less laterally. Gradually they dry and as fine particles of dirt collect on them, they become dark in color. The scars, especially those located on the lower part of the stem, gradually change their appearance, as the stem grows, becoming more or less rounded; the surface in some cases becomes split above and below and ridged on both sides of the scar and the covering of matted threads becomes loose and falls off.

These scars may vary from 5 to 8 mm. long and from 3 to 8 mm. wide. Measurements of seventeen scars gave an average of 7 mm. long by 5.7 mm. wide. The egg cavity has a diameter of approximately 1.5 mm. The insects has been observed ovipositing on more than one occasion and Girault (*loc. cit.*) has also noted it. The following observation made at Trenton, N. J., June 18, will give an idea of the *modus operandi*.

A female unaccompanied by a male was noted in the act of oviposition on the stem. Part of the egg cavity had been eaten out

when the insect was first observed. The insect was facing upward with its feet well braced and continued the work of excavating the cavity for about five minutes. Having completed this operation, it reversed its position so that the tip of the abdomen fitted in the cavity, spent about a minute in depositing the egg and then again reversed its position and assumed one similar to that which it maintained in making the cavity except that now the cavity was more nearly under the center of its body. Having resumed its position, the beetle reached forward as far as it conveniently could without moving its legs and began tearing minute strips of tissue one after another from the surface, pulling them back over the cavity and contained egg and pressing them down. The first few strips were entirely removed and pushed into the cavity over and about the egg. After continuing in this operation for about ten minutes with the result that a number of the minute strips had been turned back over the egg cavity and a half-oval space marked off above the egg puncture, the beetle again faced about and assuming a like position began tearing up strips from below the egg puncture and folding them back over it. This it continued for thirty minutes with the result that a number of strips had been folded back and the oval completed below the puncture. Then assuming its previous position, it renewed the operation of tearing up and folding back the strips above the egg cavity and continued this for some 25 minutes and finally very briefly pressed down and smoothed over the whole mass. The whole operation thus occupied more than 75 minutes.

As oviposition occurs over a considerable period it results that some plants become pretty well covered with egg scars. As a rule the lowest placed eggs are the earliest laid, while the upper part of the stem is more apt to be free from punctures, but there are exceptions. The following records will give an idea of the amount of infestation. The stems were collected at Trenton, N. J., June 28.

| Total Stem Length (in Inches). | Length of Part Bearing Punctures (in Inches). | Number of Punctures. |
|-----------------------------------|--|-------------------------|
| 21 | 15 | 44 |
| 26 | 19 | 70 |
| 29 | 25 | 82 |
| 29 | 18 | 25 |
| 23 | 20 | 44 |
| 30 | 22 | 44 |
| Averages... 26 | 19 | 51 |

Again on July 13, at Trenton, N. J., the following conditions were noted:

| Total Stem Length (in Inches). | Length of Part Bearing Punctures (in Inches). | Number of Punctures. |
|-----------------------------------|--|-------------------------|
| 42 | 32 | 93 |
| 20 | 13 | 42 |
| 28 | 22 | 67 |
| 27 | 23 | 87 |
| 42 | 32 | 55 |
| Averages....32 | 24 | 68 |

Other plants were infested as follows:

| Length of Plant (in Inches). | Number of Punctures. |
|---------------------------------|-------------------------|
| 27 | 84 |
| 42 | 55 |
| 42 | 93 |
| 44 | 183 |
| 48 | 152 |

Girault records one plant as having 267 punctures and another 115.

In the course of a few days the larva hatches from the egg, eats its way in the woody portion toward the pith which it soon enters and there develops. The larva migrates little if any but simply eats out an irregularly oval place in the pith and gradually becomes more or less surrounded with the dark excrement and other material and it is in this chamber that pupation takes place. By late July pupæ may be found in some of the earlier infested stems. Pupation is of short duration and in early August adults may be observed in some infested plants. These are as usual white at first. They gradually darken and soon the adult emerges through a circular exit hole cut through the side of the stem near the pupal chamber. The descriptions of the different stages follow.

Egg.—"Length .80 mm., width .65 mm. Short oval to oval; surface covered with a grayish deciduous substance not unlike a covering of thin sugar and which is opaque and without sculpture. When this is rubbed off, the surface of the egg is polished yellow, with no marked sculpture but slightly coriaceous or like the surface of some leathers. Soft, pliable, easily crushed. Inconspicuous. General color grayish yellow; when seen in natural position the upper side (and also the lower) is slightly flattened. Deposited singly. When ex-

amined with transmitted light the egg is liquid yellow or amber opaque centrally; this color persists until hatching. The pruinose coating is easily removed by gently rolling the eggs between the fingers. The micropyle is not conspicuous" (Girault).

Full-Grown Larva.—Length 7 to 8 mm. Width 2.2 mm. Typical curculio-shaped, creamy white; head small, brownish, mouth parts darker; body strongly convex above, somewhat flattened beneath; skin transversely wrinkled; apodous; hairs on head and body short, sparse; thoracic ambulatory tubercles present.

Pupa.—Length 6.5 mm. Width 2.1 mm. Creamy white; head and thorax bearing a few hairs with pronounced tuberculate bases; dorsal surface of each abdominal segment bears a transverse row of few hairs; tuberculate bases of hairs become larger toward anal segment; body terminated by two parallel spines.

Adult.—*Tyloderma foveolata*. The following is the original description: "Body black, with dilated punctures; head with dense, small punctures, a frontal indentation, and a yellow spot; rostrum robust, moderately arcuated, punctured like the head; antennæ jointed; first joint hardly reaching the eyes; thorax with three small yellowish spots and one before; elytra with regular series of large quadrate punctures; several small yellowish spots and a large, irregular one behind; feet unarmed. Length less than one fifth of an inch."

The adults vary much in size and sculpture, the punctures of the elytra sometimes being in regular rows and again very unevenly distributed.

As has been indicated the development of the insect is very irregular, oviposition beginning in May and continuing well through July, while pupæ were noted in some stems on September 11. The irregularity of development is well shown by the records obtained from some stems examined on June 29, which are as follows: At Woodstown, N. J., 5 small larvæ, 8 medium-sized larvæ, 8 large larvæ, 1 parasitic cocoon were found. At Springfield, N. J., on August 18 the following record was obtained: 4 small larvæ, 2 medium-sized larvæ, 17 large larvæ, 10 pupæ, 5 adults, 5 exit holes from which adults had emerged, 4 parasitic larvæ, 4 parasitic pupæ. It is also worth noting that no apparent injury is done to the primroses by the beetles even when the infestation is severe. Infested plants grow and flower more or less like uninfested ones.

Another interesting point is that there are as a rule many more egg punctures in a stem than will be adults developing from that stem. For example on a stem examined July 29, of 85 egg punctures, over half contained collapsed eggs or nothing. This is due in part to parasitism, but there is also some other factor concerned. Girault has described a species which he bred from the egg of *Tyloderma foveolata*, known as *Anaphoidea sorditata* Gir. (JOUR. N. Y. ENT. SOC., Vol. XVII, p. 169, 1909). We have obtained this species from eggs collected at Woodstown and several localities in the northern part of New Jersey during June and July.

In addition to the egg parasites there are also several species attacking the larvæ. Pierce (Bul. 73, Bul. 100, U. S. Bur. Ent., 1908, 1912) has recorded several parasites of this species. He states: "It is highly parasitized by *Neocatalaccus tylodermæ*, *Urosigalphus* sp., *Cerambycobius cyaniceps*, *Eurytoma tylodermatis*, *Microbracon mellitor*, and *Sigalphus curculionis*. The four last species are also parasites of the boll weevil. At Trenton, N. J., on September 7, we bred *N. tylodermæ* from stems of primrose infested by *Tyloderma foveolata*q."

The parasites infest the larvæ in the burrows. On several occasions we have observed the parasitized larvæ and parasitic cocoons in the burrows as late as November. From these, adults have been secured later. From this it appears that the parasites pass the winter as pupæ in the burrows and emerge the following spring.

Acanthoscelis acephalus Say.

This species has long been known as a frequenter of evening primrose and as a feeder in the axils of the leaves. Hamilton credits it to *Polygonum*, especially *P. hydropiper*, but it is extremely similar to *Acanthoscelis curtus* which lives on *Polygonum*, there is here a possibility of error. It ranges according to Blatchley and Leng (Rhyn. N. E. Amer.) from Canada and New England to Michigan, Colorado and Kansas south to Georgia. It is frequent throughout Indiana, May 23 to August 2, on evening primrose. Smith (Ins. N. J.) records it as common all along the shore of New Jersey from May to September on the same plant. As a matter of fact it is quite common all over the southern half of the state and occurs more or less abundantly at such inland places as New Brunswick, Riverton,

Princeton, etc. Early in the season the adult appears to prefer feeding in the axils of the leaves, but later it will be found in addition on the developing flower buds and flowers. The larval stage is passed in the developing flower buds.

Egg.—From dissected female. Length 0.65 mm. Width 0.2 mm. Yellowish white or light with slight yellow tinge; glistening; elongate, broadly rounded at both ends, one end slightly narrower than the other.

Full Grown Larva.—Length 6 mm. Width 1.9 mm. Typical curculio-shaped form; creamy white; head reddish-brown, posterior portion of top and sides darker, anterior portion of labrum and mandibles brownish black; dorsal surface strongly convex; ventral surface weakly concave; head and body bearing several minute hairs; body surface minutely shagreened. Young larva more strongly curved than older one and somewhat lighter in color.

Pupa.—Length 3 mm. Width 2.1 mm. Whitish or creamy white; elytra and wings extend strongly ventrally and posteriorly, the wings extending beyond elytra and approaching each other on the ventral surface. The doubled up femur and tibia of the middle leg extends laterally well over the wing pad and the posterior one extends beneath and beyond. A pair of well separated and prominent, comparatively long spine-like hairs with tuberculate bases is borne between the eyes; anterior to this pair is another pair; anterior margin of prothorax bears a median pair and another pair lateral to it; median dorsal portion of prothorax bears a transverse row of four hairs; a pair of median separated hairs arises toward posterior margin of prothorax and also a pair lateral to these and closer to the posterior margin; between these on the posterior margin is a single hair. Each femoral-tibial joint bears a pair of hairs.

Adult.—*Acanthoscelis acephalus*. This was described by Say in 1824 (Jour. Acad. Nat. Sci. Phil., IV, p. 309; Lec. ed. II, 173) whose original description follows: "Blackish, spotted with cinereous; thorax with an impressed line, an obtuse tubercle on each side.

"Inhabits the United States.

"Body covered with short robust hairs or scales, brownish-black, spotted and varied with cinereous, imbricate; head, when at rest, completely retracted within the thorax, somewhat retuse between the eyes; thorax anterior margin abruptly contracted into a collar; posterior

edge minutely dentate; an impressed longitudinal line becoming canaliculate towards the scutel; an obsolete, obtuse tubercle each side of the middle; elytra striate; striæ with scales concealing the punctures, interstitial lines with elevated and acute points partially concealed by the scales; tip rounded and piceous on the edge; anal segment black; feet rufous; thighs mutic.

"*Var. a.* A common double abbreviated line at the base of the suture.

"Length more than one tenth of an inch.

"The variety occurs in Pennsylvania. A different species, which I have named *4-spinosus* inhabits this State, remarkable for its similarity to the *acephalus*, but it may be immediately distinguished by the armature of two upright spines on the anterior edge of the thorax. (Belongs *Caliodes*. Lec.)"

In New Jersey the overwintering weevils appear during May and frequent the axils of the leaves where they feed. An examination of the small leaves at this time will show small notches where the tissue was consumed. These notches become intensified as the injured leaves develop. Later in the season when the flower buds are developing, eggs are evidently deposited. As a rule a bud contains only one larva, rarely two. The larva feeds on the immature floral parts until full grown, when it leaves the bud, drops to the soil which it enters to a depth of about one half inch and pupates, this stage requiring about ten or twelve days. Infested buds do not show any outward indication of infestation except perhaps a very slight swelling. Full-grown larvæ appear to be most plentiful from the middle of July on through to the last of August and during the last of August and first week of September adults appear in numbers and feed on the developing heads of the plants, later going into hibernation.

Adults, however, can be found throughout the entire season, part of these undoubtedly being the overwintering ones which persist for a long time, others being those which have developed from the first laid eggs and the remainder being later members and stragglers of this brood. In many instances it was noted that partly or slightly eaten buds opened and the larva would be found attached to the expanded petal. The larva was found to be parasitized by a small hymenopterous larva which we were unsuccessful in breeding to the adult stage.

Haltica marevagens Horn.

This blue flea beetle occurs throughout New Jersey but is most abundant in the southern part. It feeds during both larval and adult stages on the foliage of primroses, skeletonizing the leaves from either the upper or lower surfaces.

Egg.—Length 1.2 mm. Width 0.4 mm. Subcylindrical, obtusely rounded at both ends. Color buff when first laid, becoming darker yellow and finally orange yellow just before hatching. Many eggs streaked lengthwise with a thin line of dark excrement. Outer surface of chorion sculptured with slight subcircular, contiguous depressions with slightly tuberculate elevations between them.

Full Grown Larva.—Length 5.8 mm. Width 1.7 mm. Ground color olive to dark olive, which with dark tubercles cause some larvæ to appear almost black. Subcylindrical, somewhat flattened ventrally, tapering at both ends. Body surface finely shagreened, bearing many tuberculous spots of varying shapes and sizes, some of which bear one and others two bluntly tipped hairs. Antennæ short. Head rounded, lobes moderately constricted posteriorly; front with a median, shallow depression. Color shining black except for a narrow lateral spot including and dorsal to each antenna. Head bearing several hairs on front and sides. Thoracic plate covering dorsal surface of prothorax which bears a single lateral spot. Thoracic plate is of same ground color as other tuberculous spots. Fine median line divides thoracic plate and continues through median, dorsal tuberculous spots of meso- and metathorax. Median dorsal spots of meso- and metathorax similar to those of abdominal segments. Lateral to each of these is a single spot of which the posterior one is much the larger. Below these spots is a longitudinally elongated, spiracular spot and below this a pair of spots. Each abdominal segment beginning with the first bears two transversely elongated, median, dorsal spots placed one behind the other, of which the anterior is the longer. Lateral to each of these on each side are two somewhat more circular spots thus forming two transverse rows of tuberculous spots on the dorsal surface. Below this double row on either side is a tuberculous spot containing the spiracle, below which are two other spots arranged transversely. On the last abdominal segment, the spots are united so as to form single dorsal and ventral spots. On each ventral abdominal segment is an elon-

gated, median, transverse spot posterior and lateral to which is a single spot. Ventral spots of thoracic segments similar to those of abdomen except that the median spot is rounded and that of the prothorax is confluent with the two others forming an irregular one. Outer portions of legs dark brown except for apical portions of femora which are light; inner surfaces lighter. Newly hatched larvæ are somewhat lighter in color than mature ones. The same spots are apparently present but are not clearly defined and appear more confluent.

Pupa.—Length 3.9 mm. Width 1.75 mm. Light yellow. Surface bearing several acutely pointed spine-like hairs arising from minute, darkened tubercles and arranged as follows: Head bears one at base of each antenna; one at outer margin of each eye and one posterior and medianly to this. Prothorax bears a pair on anterior margin on both sides of middle; three on outer angle of lateral margin and a pair of somewhat separated ones on posterior margin near lateral margin; also a median dorsal pair. Meso- and metathorax bear a single one toward lateral margin. Each abdominal segment bears on its posterior margin a transverse, dorsal row of six spine-like hairs (on some segments several of these hairs appear to be missing). Spiracles dorsal, prominent, near lateral margin of each abdominal segment beyond which is a single hair. Extremity of abdomen terminating in a pair of short stout spines. Apices of all femora bear a pair of hairs.

Adult.—*Haltica marevagans*. This was described by Horn in 1889 in his paper, "A Synopsis of the Halticini of Boreal America" (Trans. Amer. Ent. Soc., Vol. XVI, p. 226) and his description follows: "Oval, slightly oblong, moderately convex, deep blue, rarely slightly greenish, shining. Antennæ half as long as the body, obviously thicker externally, piceous, bluish at base, joint four distinctly longer than third and equal to fifth. Head smooth, frontal carina scarcely prominent, the tubercles flat and indistinct. Thorax more than half wider than long, sides arcuately narrowed to the front, margin very narrow, slightly thickened at front angles, disc convex, ante-basal impression extremely indistinct, often obliterated; surface sparsely, finely punctate near the base, an oblique series of coarser punctures beginning at the front angles. Elytra a little wider at base than the thorax, humeri rounded, umbone feeble, a

slight flattening within it, surface finely, but very indistinctly punctate, not closely, smoother near the apex. Body beneath and legs colored as above; abdomen coarsely, not closely punctate. Length 4-4.5 mm.

"The last ventral of the male has a very distinct sinuation each side, the middle lobe flat, with a deep longitudinal impression extending over half the segment and ending abruptly. In most of the collections examined this species is labelled *foliacea*, from which it differs in form, sculpture and male characters. Occurs along the sea-coast region from Florida to New Jersey, and probably farther north."

In New Jersey the beetles appear during the first part of June and deposit eggs on the leaves of primrose. As a rule these are placed on the lower surface in groups of two or three, although in some few cases as many as twelve were noted in one batch. In a few instances eggs were found on the stems. The eggs are laid on their sides and glued to each other and to the leaf. They hatch in about one week and the larvæ skeletonize the leaves usually from the under surfaces. When full grown they enter the soil in which they pupate, constructing small cells for this purpose about one half inch below the surface.

During the last of July adults appear and eggs are again deposited during the first of August. The second brood of larvæ feed mostly on the leaves but many of those which mature late are found feeding on the small flower buds and even on the green seed capsules. These become full grown about the last of August and then pupate, about two weeks being required for this stage, the hibernating brood of beetles appearing about the middle of September. On account of the overlapping of the two broods adults can be found throughout the state from June through September. In view of the fact that some beetles were found in the pupal cells in the soil during the last half of September, it is quite probable that some overwinter in such places.

Haltica fuscoænea Mels.

This species is another flea beetle which appears to confine its attacks to evening primrose. It occurs in various parts of New Jersey but is especially abundant in the southern part. Its method

of feeding and habits are similar to those of *marevagens* and very often the foliage is completely riddled.

Egg.—Length 0.7 mm. Width 0.21 mm. Except for its smaller size it is similar to the egg of *Haltica marevagens*.

Full Grown Larva.—Length 4.5 mm. Width 1 mm. Somewhat like that of *H. marevagens* in general appearance and number and arrangement of tuberculous spots. However, the following differences are to be noted: the larva is smaller; shagreening is finer; ground color is lighter, being yellowish green; the spots also are of a lighter brown and differ in some cases in outline; the spiracular spot is closer to the two dorsal lateral spots above it and more in between them; when the spot below the spiracular spot is compared with the spiracular spot, a greater difference in size will be found in *fuscocænea* than in *marevagens*; the median line dividing thoracic plates and median thoracic spots is wider in *fuscocænea* than in *marevagens*.

Pupa.—Length 2.8 mm. Width 1.4 mm. Light yellow; smaller than that of *marevagens*; spine-like hairs on head similar to those of *marevagens*; prothorax bears a single spine-like hair on posterior margin instead of a pair as in *marevagens* and a dorsal pair anterior to median, dorsal pair; meso- and metathorax bears a pair of median ones and a single one each side of these; abdominal hairs placed similar to those of *marevagens*; extremity of abdomen terminating in a pair of stout spines which are more elongate than those of *marevagens* and slightly incurved at the tips.

Adult.—*Haltica fuscocænea*. This was described by Melsheimer in 1847 (Proc. Phil. Acad. Nat. Sci., III, 165). The following re-description is by Horn (Trans. Amer. Ent. Soc., Vol. XVI, p. 229): "Oblong oval, moderately shining, olivaceous green, antennæ and legs rufotestaceous. Antennæ a little longer than half the body, joints 2-3-4 gradually increasing in length. Head finely alutaceous, a faint transverse groove between the eyes in which are a few indistinct punctures, frontal carina broad and obtuse, the tubercles small. Thorax transversely subquadrate, very little wider than long, not narrower at apex than base, sides very feebly arcuate, margin very narrow, slightly thickened at the front angles, disc convex, the antebasal impression fine, but moderately deep, extending nearly from side to side, surface finely alutaceous and with very minute sparse

punctures. Elytra not wider at base than the thorax, humeri broadly rounded, umbone not distinct, surface distinctly sparsely punctate near the base, smoother at apex. Body beneath piceous with æneous luster; abdomen sparsely punctate. Legs rufotestaceous, the posterior femora piceous with æneous surface luster. Length .12-.14 inch; 3-3.5 mm.

"In the male the last ventral is truncate at middle, a slight sinuation on each side, the middle at apex flattened, the edge slightly reflexed. This species has rather the habitus of a *Chatocnema* than *Halitica* in general. The nearly square thorax, together with the pale antennæ and legs will enable it to be distinguished from *polita* and all the others of the genus. Occurs from Massachusetts to Georgia."

In New Jersey it occurs from May to September and according to Smith (Ins. N. J.) it is especially common on evening primrose along the shore. However, we have found it also common as far inland as the Delaware River in the southern part of the state. It is notably scarcer, however, in the northern sections.

In the southern counties it appears during the first week of May and deposits eggs on the foliage of primrose, usually on the lower surfaces. These are placed as a rule in groups of two or three. The eggs are yellow and covered with a whitish envelope which sometimes cracks and falls off. A similar covering is present on the eggs of *marevagans*. The life-history in fact appears to be like that of *marevagans*. About six weeks are necessary for a complete life cycle. Adults appear about the first of May. About the middle of June and again during the first week of August adults appear in numbers. Eggs are again laid at this time and the larvæ when full grown enter the soil and pupate. The evidence at present points to the winter being passed in this stage. During the summer pupation requires about ten days.

OTHER PRIMROSE FEEDERS.

Agallia sanguinolenta Prov.

On July 15 at Lakehurst, N. J., nymphs and adults of this leaf-hopper were observed on evening primrose. It is known as the clover leaf-hopper and usually confines its attacks to clover, alfalfa, cowpeas and vetch. However, it is common in meadow and pasture

lands and feeds on a number of cultivated and native grasses. Its occurrence on primrose at only a single locality in New Jersey probably indicates an accidental infestation due perhaps to the absence of its favorite food plants. This species and its control have been covered by Mr. E. H. Gibson in a recent Farmers' Bulletin (Bul. 737, U. S. D. A.).

Thecodiplosis zauschneriae Felt.

Rosette galls on the heads of several plants were noted at Monmouth Junction, N. J., on July 10 and itonid larvæ presumably of this species were taken from the bases of the leaves of the rosette, eight in one head and five in another. In no other locality were such rosette galls found. *T. zauschneriae* was described by Felt in 1912 (JOURN. N. Y. ENT. SOC., 20: 146-56).

PLANT LICE.

According to the "Food Plant Catalogue of Aphididae of World," Part V, by Dr. Edith M. Patch (Me. Ag. Exp. Sta. Bul. 270, 1918) the following species are listed under *Oenothera biennis* L.

Aphis gossypii Glover.

Aphis anotheræ Oestlund.

Myzus biennis Sanborn.

Myzus anotheræ Williams.

Pemphigus anotheræ Williams.

Siphonophora sp. Williams.

In New Jersey we have noted *Aphis anotheræ* Oest. (det. Dr. C. P. Gillette and L. C. Bragg) early in the season in large numbers on primrose leaves and stems. Later in the season *Macrosiphum gauræ* Will. (det. C. P. Gillette and L. C. Bragg) occurred abundantly on the stems and green seed pods. At Riverton, N. J., July 2, *Paragus tibialis* was bred from larvæ feeding on plant lice infesting primrose. A number of lady-bird beetles were noted in connection with aphid infestations and these are treated under the list of Coleoptera.

MISCELLANEOUS SPECIES FOUND ON EVENING PRIMROSES.

Unless otherwise noted the insects named in the following lists were taken on the foliage of evening primrose. The few records from outside sources are followed by the references. It is realized of course that many of the species mentioned have no direct asso-

ciation with the plants and are probably only accidental visitors. Further collecting would add many names to this list.

HOMOPTERA.

Ormenis pruinosa Say.

Palmyra, VII 29, N. J.

Scolops sulcipes Say.

Arlington, VII 25, N. J.

Phlepsius irroratus Say.

Fairlawn, N. J., VII 5.

Scaphoideus immistus Say.

Eatontown, VIII 9, N. J.

HEMIPTERA.

Euschistus variolarius Pal. Beauv.

Tuckerton, N. J., VIII 21.

Thyanta calceata Say.

West Norwood, N. J., VII 24.

Thyreocoris pulicaria Germ.

Springfield, VII 10; Arlington, VII 25, N. J.

Thyreocoris aterrima Mal.

Arlington, N. J., VII 25.

Lygus pratensis L.

Woodbury, N. J.

Ortholomus longiceps Stal.

Fairlawn, VII 25; Monmouth Junction, VII 8; Riverton, Lakehurst, VII 15, N. J. Widely distributed, on primrose.

Jalysus spinosus Say.

Riverton, N. J., August.

Nabis roseipennis Reut.

Fairlawn, N. J., VII 8.

Sinea diadema Fab.

Irvington, N. J., VII 2.

Phymata erosa L.

Arlington, N. J., VII 25.

Triphleps insidiosus Say.

Princeton Jc., VII 2, N. J. Widely distributed on primrose.

Plagiognathus politus Uhl.

Springfield, VII 10; Riverton, VIII 20, N. J.

***Resthenia insignis* Say.**

Lakehurst, N. J., VII 17.

***Neurocolpus nubilis* Say.**

Arlington, N. J., VII 25.

***Poeciloscytus basalis* Reut.**

Lakehurst, N. J., VII 17.

***Poeciloscytus lineatus* Fab.**

Uhlertown, Pa., VI 11, seriously injuring the foliage.

COLEOPTERA.

***Hippodamia convergens* Guér.**

Woodbury, N. J., VI 30, feeding on plant lice.

***Hippodamia glacialis* Fabr.**

Plainfield, VII 9, N. J.

***Coccinella novemnotata* Hbst.**

Monmouth Jc., N. J., V 30, feeding on plant lice.

***Adalia bipunctata* L.**

Nutley, VII 5, N. J.

***Cycloneda sanguinea* L.**

Lyons, VIII 4; Atlantic Highlands, VIII 15, N. J.

***Coccinella 3-fasciata* L.**

Monmouth Junction, VIII 17, N. J., feeding on plant lice.

***Brachyacantha ursina* Fabr.**

Irvington, N. J., VII 12.

***Hyperaspis undulata* Say.**

Arlington, N. J., VII 25.

***Scymnus fraternus* Lec.**

Woodbury, N. J., VI 30.

***Lebia viridis* Say.**

Riverton, VIII 20; Eatontown, VII 5; Lakhurst, VII 25, N. J.

***Scirtes tibialis* Guér.**

Monmouth Junction, N. J., VII 15.

***Pyropyga decipiens* Harr.**

Plainfield, N. J., VII 9.

***Chauliognathus marginatus* Fabr.**

Plainfield, N. J., VII 9.

***Podabrus rugulosus* Lec.**

Monmouth Junction, N. J., V 30.

Lachnosterna lanceolata Say.

Feeding on evening primrose (W. P. Hayes) (Jour. Econ. Ent., Vol. 12, p. 115).

Anomala lucicola Fab.

Woodbury, N. J., VI 30; Uhlerstown, Pa., VI 11, plentiful at latter locality and injuring foliage considerably.

Popilia japonica Newm.

Riverton, N. J., August, feeding on foliage.

Lema 3-lineata Oliv.

Monmouth Junction, N. J., V 30; this is the old-fashioned potato beetle.

Graphops marcassitus Cr.

Trenton, V 26; Rutherford, VIII 19, N. J.

Graphops pubescens Mels.

Common throughout New Jersey, May to September on foliage of evening primrose. This is one of the strawberry root borers. Smith (Ins. N. J.) states "at roots of evening primrose" (CH.), but we were unable to locate it there in any stage, although it was plentiful on the foliage and buds.

Colaspis brunnea Fab.

Uhlerstown, Pa., VII 8.

Plagioderma versicolor Laich.

New Brunswick, N. J., VI 30, on primrose near willow.

Diabrotica 12-punctata Oliv.

Tuckerton, N. J., VIII 21.

Galerucella nymphaeae L.

Monmouth Junction, VII-7, on primrose near water.

Epitrix cucumeris Harr.

VI 10; Woodbury, VI 30; Princeton, VI 20, N. J. Feeding on foliage of primroses near potato fields.

Haltica exapta.

On evening primrose. (Ins. Life, Vol. 3, p. 26.)

Haltica ignita Ill.

Atlantic Highlands, N. J., VIII 25. The strawberry flea beetle. According to Chittenden (U. S. Bur. Ent. Bul. 23, pp. 70-78) the beetle also deposits eggs on the leaves of primrose and related plants and the larvæ feed on the leaves and seed pods (Schwarz). We have not found this species breeding on primrose in New Jersey, but

have found *H. fuscoænea*, a related species resembling *ignita*, very abundant in places.

Chætocnema denticulata Ill.

Springfield, N. J., VIII 12.

Systema hudsonias Forst.

Trenton, N. J., V-18.

Rhipiphorus dimidiatus Fabr.

Palmyra, N. J., VII 29.

Phyllotreta sinuata Steph.

Monmouth Junction, N. J., VI 10, feeding on foliage.

Coptocycla bicolor Fab.

Trenton, V 26, N. J.

Mordella 8-punctata Fabr.

Monmouth Junction, N. J., VII 18.

Auleutes ater Lec.

Monmouth Junction, N. J., VI 10, feeding at bases of young leaves.

Otorhynchus ovatus L. Trenton, N. J., VI 26. The larva of this species is the strawberry crown-girdler.

Sitones hispidula Germ.

Woodbury, N. J., VIII 21.

Gymnetron teter Fab.

Monmouth Junction, N. J., VI 10, feeding in heads and in axils of leaves.

Chalcodermus collaris Horn.

Occurs on evening primrose in Illinois (Hart). (Rbyn. N. E. Amer.)

Tyloderma ærea Say.

Trenton, N. J., V 26; Hackensack, November, in rosettes.

Acanthoscelis curtus Gyll.

Monmouth Junction, N. J., VI 10, feeding at bases of young leaves.

Cœlogaster zimmermanni Gyll.?

Uhlerstown, Pa., VI 11.

Madarellus undulatus Say.

Woodbury, N. J., VIII 21.

Mecopeltus scandens Dietz.

Anglesea, N. J., VII 12 (W.) (Ins. N. J.). Occurs on primrose (Robinson) (Rbyn. N. E. Amer.).

LEPIDOPTERA.

Eupithecia interruptofasciata Pack.

New Brunswick, N. J., August 23, bred from larva found feeding on foliage (det. W. Schaus).

Sparganothis sulfureana Clem.

Riverton, N. J., September 19, bred from larva feeding on primrose.

HYMENOPTERA.

Monostegia martini MacG.

Larva feeds on *Oenothera* (Bul. 22, Conn. Geol. Nat. His. Sur. Hymen. Conn., p. 47).

Inastemma sp.

West Norwood, N. J., VII 24, taken on head of evening primrose (det. A. B. Gahan).

Monomorium minimum Emery.

Riverton, N. J., July 29, in flower buds which had been partly eaten out by other insects.

Cremastogaster lineolata Say.

Egg Harbor, N. J., August 3.

Myrmica scabrinodis Nylander.

Arlington, N. J., VII 25.

Leptothorax curvispinosus Mayr.

Trenton, N. J., VII 1, in primrose stem. Arlington, N. J., VII 25.

Tetramorium cespitum L.

Monmouth Junction, N. J., V 30.

Tapinoma sessile Say.

West Norwood, N. J., VII 24.

Prenolepis imparis Say.

Eatontown, N. J., VIII 29; Atlantic High., VIII 15, N. J.

Formica fusca Linné var. *subsericea* Say.¹

Fairlawn, VII 5; Monmouth Junction, V 30, N. J.

Formica pallide-fulva var. *fuscata* Emery.

Atlantic Highlands, N. J., VIII 16.

Nysson plagiatus Cress.

Eatontown, N. J., VIII 29. In flowers.

Halictus cressonii Rob.

Lakehurst, N. J., VII 17, in flower.

¹ Identified by Dr. Wheeler.

Halictus ligatus Say.

Monmouth Junction, N. J., VIII 7, in flower.

Halictus sparsus Rob.

Atlantic Highlands, N. J., VIII 15, in flower.

Halictus illinoisensis Rob.

Tuckerton, N. J., VIII 21, in flowers.

Halictus pilosus Cress.

Tuckerton, N. J., VIII 21, in flowers.

Agapostemon virescens Fab.

Monmouth Junction, N. J., VII 7, in flowers.

Melissodes dentiventris Smith.

Monmouth Junction, N. J., VII 7, in flower.

Prosopis cressoni Ck.

Caldwell, N. J., VII 28, bred from cell in dry primrose stem.

Stelis lateralis Cress.

Trenton, N. J., V 18, in flowers.

Bombus impatiens Harris.

Tuckerton, N. J., VIII-20 in flowers.

DIPTERA.

Paragus angustifrons Loew.

Red Bank, N. J., September 1, emerged from puparium on primrose stem (det. C. T. Greene).

Sphærophoria cylindrica Say.

Irrington, N. J., August 5, bred from larva feeding on plant lice on primrose (det. C. T. Greene).

Eristalis tenax Linn.

Observed in various parts of New Jersey visiting flowers during the fall.

STATISTICS OF PRIMROSE INSECTS.¹

| | Feeders on or in During One or More Stages. | Flower Visitors. | Found on Foli- age or Stems. | Totals. |
|--------------------------------|---|------------------|---------------------------------|---------|
| Homoptera..... | 8 | | 4 | 12 |
| Hemiptera..... | 1 | | 15 | 16 |
| Coleoptera..... | 13 | | 3 ² | 45 |
| Lepidoptera..... | 13 | 1 ³ | | 13 |
| Hymenoptera ¹ | 1 | 10 | 9 | 20 |
| Diptera ² | 1 | 1 | 2 | 4 |
| Totals | 37 | 11 | 62 | 110 |

¹ Parasites not included.² Also a feeder.

ACKNOWLEDGMENTS

We are greatly indebted to the following persons for help in the preparation of this paper: to Mr. C. W. Leng for references to the literature of the Coleoptera and identifications in this order, to Mr. C. A. Frost for determinations in the Coleoptera, to Mr. H. G. Barber for identifying the Hemiptera, to Mr. M. R. Smith for determining the ants, to Mr. August Busck and Mr. Carl Heinrich for their help with the micros and other Lepidoptera, to Dr. C. P. Gillette and Mr. L. C. Bragg in connection with the plant lice, to Dr. J. Bequaert in connection with the Hymenoptera except the parasites, and to the specialists named in the text who through the courtesy of Dr. L. O. Howard identified the dipterous and hymenopterous parasites. The photographs were taken by Mr. Erdman West, to whom we are also grateful for many miscellaneous observations on primrose insects.

EXPLANATION OF PLATES I, II AND III.

- A. Adult, *Celerio lineata*.
- B. Larva of *Celerio lineata*.
- C. Adult, *Rhodophora florida*.
- D. Adult, *Apantesis arge*.
- E. Adult, *Euthisanotia unio*.
- F. Adult, *Desmia funeralis* (after Strauss).
- G. Primrose stem split lengthwise showing winter cells of *Mompha eloisella* larvæ. Third cell from top shows the silken lining.
- H. Enlarged view of I.
- I. Single larval cell of *Mompha eloisella*.
- J, K. Primrose stem split showing larvæ and larval cavities of *Tyloderma foveolata*.
- L. Adult, *Mompha eloisella*.
- M, N. Primrose leaves showing feeding of *Haltica marevagans* and *Haltica fuscoænea* larvæ and adults.
- O. Swollen primrose flower bud infested by the larva of *Mompha stellella*.
- P. Folded primrose leaf containing pupa of *Desmia funeralis*.
- Q, R. Primrose flower buds in different stages of development.
- S. Seed capsule of evening primrose in different stages of development.

T, U. Dry seed capsules showing exit holes of *Mompha circumscriptella* and *Mompha brevivittella*.

V. Primrose stem during the winter showing the dry, open seed capsules.

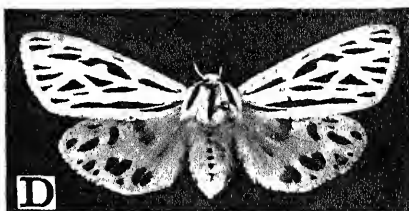
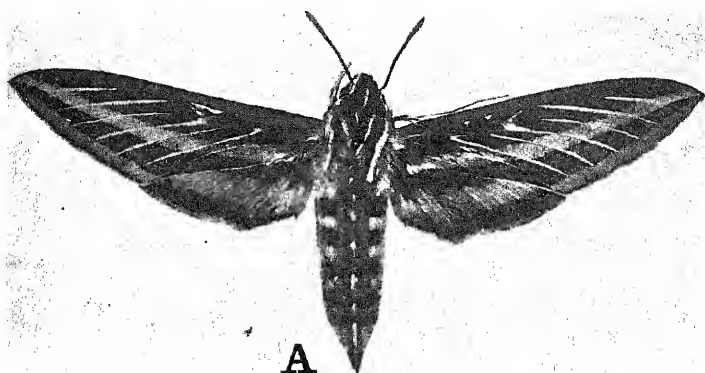
STUDIES IN RHYNCHOPHORA. IX. THE SEXES OF CONOTRACHELUS BREVISETIS CHAMP.

By D. SHARP,

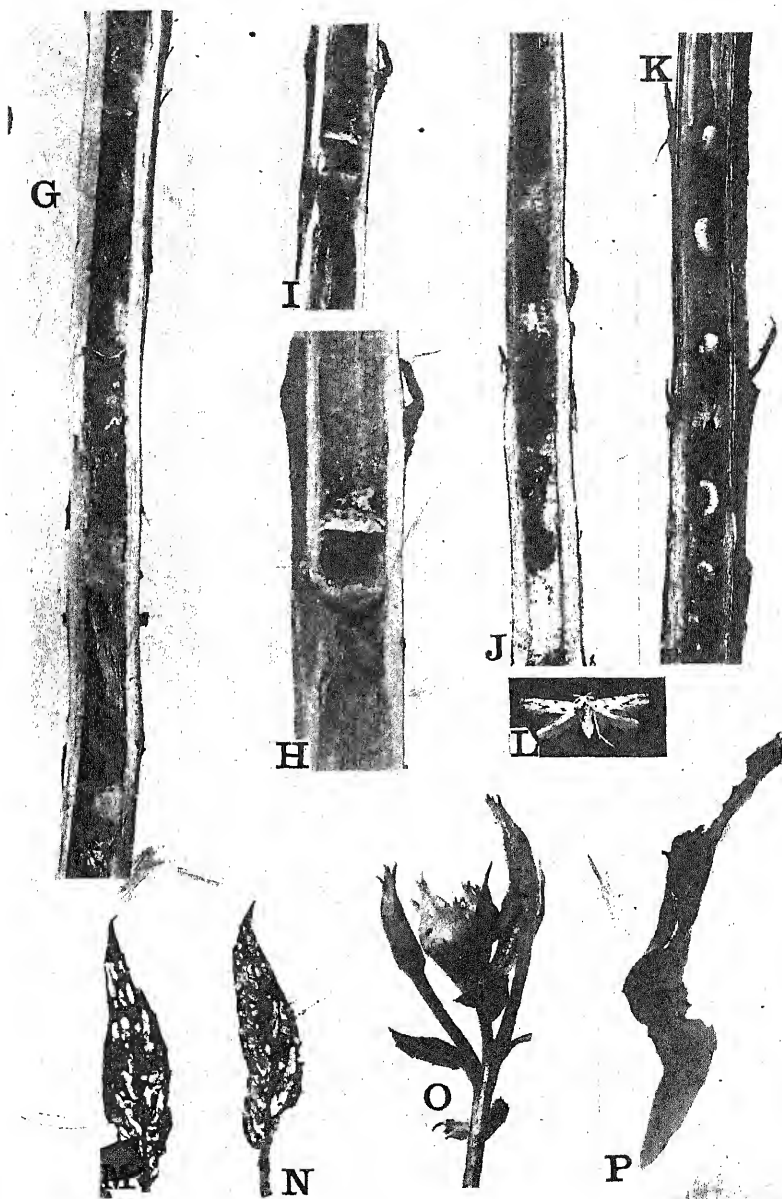
BROCKENHURST, ENGLAND.

The species was described by Champion (Biol. Centr. Amer., 4, pt. IV, p. 402, pl. 20, figs. 14, 14a, b, and c), who recognized it as occurring in Guatemala, Panama and Venezuela. I have recently received a series from French Guiana which are apparently this species; Mr. Champion after comparison of a pair of the Guiana examples has decided that they are the same as the Central American form. The species is remarkable externally on account of the last dorsal being unusually extended forwards on the venter, as described by Champion, "in the male the pygidium exposed and becoming ventral." This character induced me to dissect some of my specimens, as I have found that unusual shape of the last body-segment in the male is usually accompanied by peculiar conformation of the internal sexual apparatus. And on making dissection I found so strange a structure that I forwarded specimens to Mr. F. Muir in Honolulu. He and Mrs. Muir examined them carefully, and were so good as to make drawings, which are reproduced on the plate accompanying this paper.

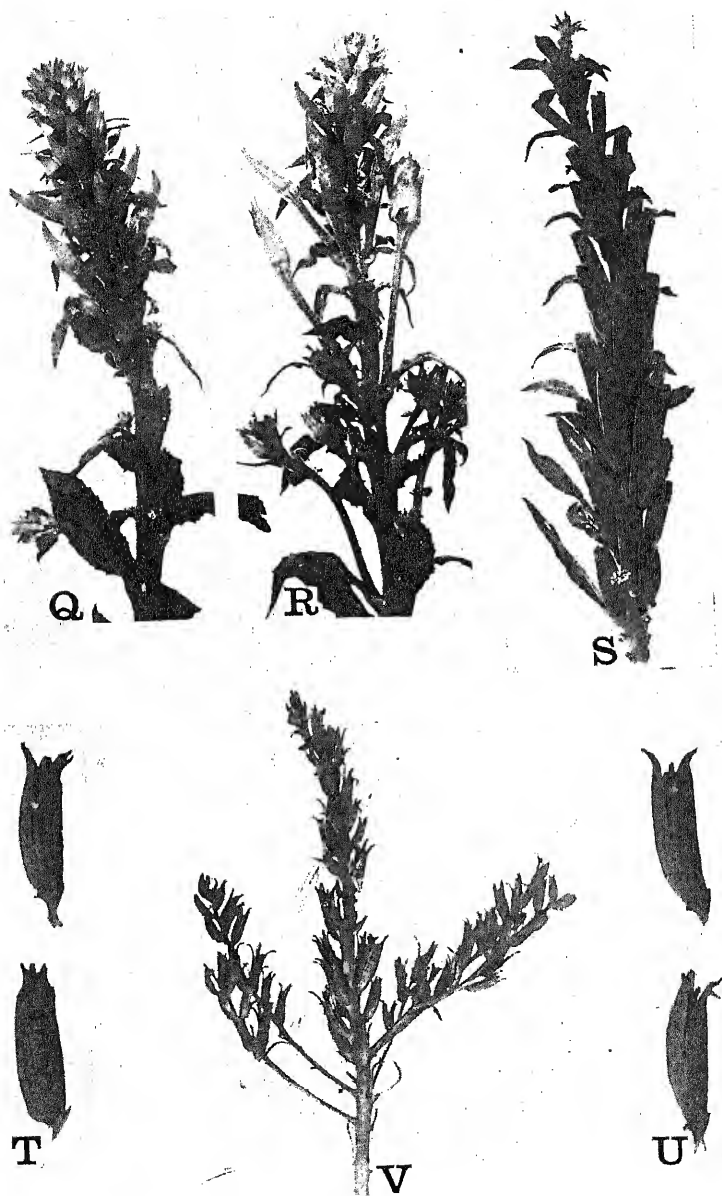
The male, figures 2 to 6, has the apex of the median lobe deflexed so that it is at right angles with the body of the lobe, the struts *ms.* are very short. The tegmen, *tg.*, is a ring, without strut, but the sides of the ring are prolonged as two delicate superior appendages, *tgt.*, the dorsum of the ring has only a very slender connection with the side (fig. 3 shows this angle rather too robust). The body, *ml.*, of the median lobe shows a depression, *mo.*, commencing before the deflexed apex and continued for some distance on the deflexed



PRIMROSE INSECTS.



PRIMROSE INSECTS.



PRIMROSE INSECTS.

process; ventrally opposite to the median orifice is a membranous bulge, *d*. If the median orifice be looked at as perpendicularly as possible, it presents somewhat the appearance shown in fig. 4, which shows a central chitin sclerite, *c*., and a median one, *ta*.; the latter varies in appearance according to whether the sac is greatly retracted. When the sac is extended it is found to be a bladder-like structure with a lobe at its base; this lobe consists of very complex hard pieces partially shown in fig. 6, and through it runs the ejaculatory duct, *ej*., opening on a spot *fo*., in the middle of this transfer apparatus; this spot is the functional orifice where the sperm leaves the male structure for transference to the female. The extreme hardness and the very complex shape of this transfer apparatus is unusual in the Curculionidæ; but in the Tomicidæ division of the Scolytidæ there exist very remarkable analogous formations, the "Aufsatz" of Lindeman, which I anticipate, when carefully examined to find the ejaculatory duct, will also be found to bear the functional orifice.

The position of this transfer apparatus at the base of the main division, *is*., of the sac is also remarkable, as it is usually closely connected with the wall of the main sac, and placed more or less at its apex.

The shape and nature of the transfer apparatus differs greatly in the various forms of Rhyncophora, so that it will be difficult to generalize it for the purpose of definition of the great groups, but it will be found very important in the case of definition of genera and tribes.

Much mystery at present surrounds the male genitalia, which is a sign of our ignorance. We say that as regards the great modifications of the outer skeleton of an insect that they are "adaptations." But no one so far as I am aware has endeavored to account for the great diversities we find in the male organs. If they are the results of "adaptations," what is the nature of these?

The first idea that suggests itself is that there will be found to be a correlation between male and female peculiarities, and I believe that this will prove to be the case to a considerable extent. Unfortunately we know but little of the female structures in Coleoptera. In 1847 Stein published a very valuable work on the subject, "Die weibliche Geschlechtsorgane der Käfer," Berlin, and this remains the only general work on the subject, but deals with only 3 or 4 Rhyncophora; Nüsslin has since given up particulars of the structure of 15

or 16 forms, but they all belong to the Scolytidæ, which is a very exceptional and limited division of the Rhyncophora (Zeitschr. wiss. Ins. biol., 7, 1911, p. 306, etc.).

Our means of forming a conclusion on the point I am alluding to are therefore very limited, and the question will have to be answered by concomitant considerations of the males and females of particular species. The female structures are more difficult of investigation than the male, and I have paid comparatively little attention to them, still I have formed the opinion that there exists a correlation of the kind I have suggested and that *Conotrachelus* offers an exemplification of it.

Figure 1 gives a representation of the female structure of the species, where *ut.* is the bursa, *spt.* the spermatheca and *ovd.* the common oviduct; as regards the parts near the anal aperture the figure is diagrammatic, but the other parts are fairly exact.

The sperm has to be lodged in the spermatheca, which is connected with a long, slender duct to the bursa at the spot where it joins the oviduct. The sac in the male, fig. 5, *is.*, enters the bursa, and brings the functional orifice of the transfer apparatus to the mouth of the duct of the spermatheca; there is thus formed a continuous canal extending from the testes of the male to the spermatheca of the female.

Of course, one swallow does not make a summer, and one case in which we can imagine a correlation does not show that such a correlation is general, but I may mention that in the Celenthetides, where the male sac is extraordinarily long and slender (see Trans. Ent. Soc. London, 1918, pl. IX, f. 7), there is a corresponding elongation of the female passages. It must not be forgotten that these membranous parts are extremely elastic in both the female and the male and that it is very difficult to restore them to their natural functional shapes.

But if it be granted that there is a correlation between male and female structures this only increases our difficulty in understanding their variety and complication.

In the primitive condition, exemplified in *Archotermopsis* of the Termitidæ the female possesses a short oviduct, with a spermatheca having a very short duct, and colleterial glands having a separate orifice on the ninth sternite, while the male has no copulatory appa-

ratus, except the short muscular ductus ejaculatorius. (Imms, Trans. R. Soc. London, B, No. 361, 1919.) It is a long step from this simple condition to the state we find in the Rhyncophora, and yet during the evolution of this complex condition a successful correlation is maintained between the male and female structures, and this in spite of their ever-increasing divergence. It would appear at first sight that it would have been better to retain the original simplicity of the sexual structures.

At present I can see no way to comprehending the great complication of the copulatory structures that prevails in the higher insects, and that perhaps reaches its greatest extent in the Lamellicornia and Rhyncophora in Coleoptera.

One slight suggestion may be made as to the complexity of function of the female portion of the genital conduit, for its most important function is the transmission of the egg to a suitable position for its successful development; and it has also to receive the sperm from the male, to preserve it in a special receptacle, and also to fertilize each egg before its extrusion.

For each of these purposes special structures exist; but at present we know very little about the functions. Especially obscure is the process of fertilizing the egg. The spermatozoön has to pass along the duct from the spermatheca which is sometimes of extraordinary length, much longer than in *Conotrachelus brevisetis*, while in other cases it is quite short. The function of the bursa is also obscure.

We now know that in some species of Rhyncophora males are not known to exist though females are abundant; hence parthenogenesis undoubtedly occurs, and it is clear that in the history of the species the female is more important than the males, and it seems probable that in the evolution of the structures under consideration the female has led the way, and the male structures have developed in correlation with the changes in the female. But as to how this necessary correlation has been brought about I am unable to offer any suggestion of real importance.

If this paper has any value it is chiefly due to Mr. and Mrs. F. Muir of Honolulu, who made the drawings and took considerable pains to ascertain difficult points of the anatomy.

EXPLANATION OF PLATE IV.

GENITALIA OF *CONOTRACHELUS BREVISSETIS* CHAMPION.

Fig. 1. The female parts: *a*, space where the area is somewhat contracted, corresponding with the space *b* in fig. 5; *an*, anal orifice; *ovd*, the common oviduct; *spt*, spermatheca with its gland; *ut*, bursa.

Figs. 2, 3, 4, 5 and 6. The male parts.

Fig. 2. Profile of the ædægus with the sac indrawn, but with tegmen extended.

Fig. 3. Tegmen dissected off the median lobe.

Fig. 4. Apical portion of the median lobe, showing median orifice for the protrusion of the sac and transfer apparatus.

Fig. 5. Apical portion of median lobe, profile with sac extended.

Fig. 6. Face of transfer apparatus.

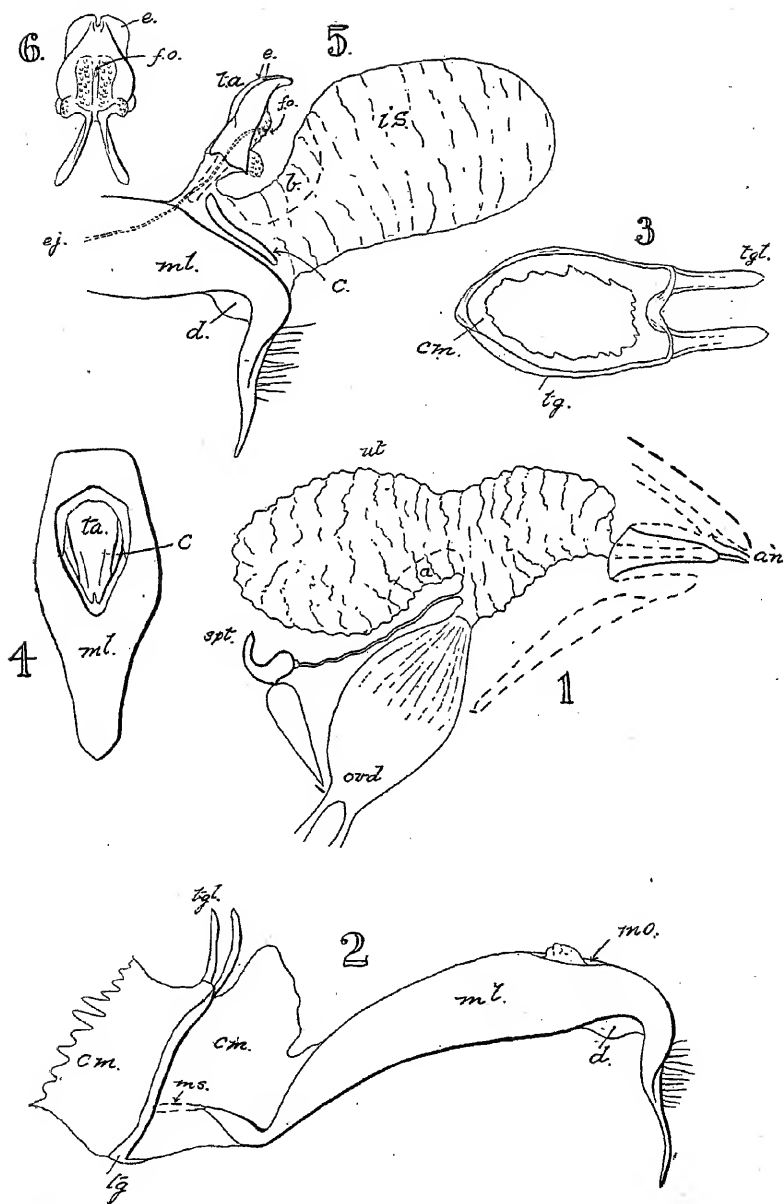
In figures 2 to 6 the lettering is uniform, as follows: *b*, contracted part of the sac; *c*, hinge or volet; *cm*, connecting membrane; *d*, membranous bulge accommodating the transfer apparatus when the sac is retracted; *e*, outer shield of transfer apparatus; *ej*, ejaculatory duct; *fo*, functional orifice; *is*, the sac; *ml*, median lobe; *mo*, median orifice; *ms*, strut of median lobe; *ta*, transfer apparatus; *tg*, tegmen; *tgl*, tegminal lobe.

THE TRUE KATYDID NEARLY EXTINCT IN NEW YORK CITY.

BY WM. T. DAVIS,

NEW BRIGHTON, STATEN ISLAND, N. Y.

The true katydid, *Pterophylla camellifolia* Fabr., is either extinct or nearly so on Staten Island, a borough of New York City. It used to be very common there, and as late as August 14, 1908, the writer noted it "quite numerous and very noisy in the tall trees in the Egbertville ravine" near the central part of the Island. There are still considerable forested areas on Staten Island that would seem to be as suitable for the insect as similar places on Long Island and in New Jersey, and indeed it used to frequent these very same trees. Why it has died out is not known, except possibly the air is no longer as pure as formerly, for there are now numerous factories along Arthur Kill, the smoke from which may have affected the foliage on which it feeds. However, it is no longer present even on the ocean side of the Island. In our investigation that carried us



CONOTRACHELUS BREVISETIS CHAMP.

over about fifty miles of the most rural parts, Mr. Edward J. Burns and I were unable to hear any true katydids on the warm nights of September, 1919, though the tree-frequenting *Microcentrum rhombifolium* was present, as were also the several native species of *Scuderia*, *Amblycorypha* and *Neoconocephalus*.

It has been shown by Dr. Joseph L. Hancock in Entomological News for February, 1916, that the eggs of *Amblycorypha oblongifolia* may not hatch until the second or third year after they have been laid. If those of *Pterophylla* can remain dormant for a like period, it is possible that some small colonies may still exist on Staten Island, but we think their presence unlikely. While we have not the same conclusive evidence for other areas of forested country lying in New York City as we have for those on Staten Island, from our observations it would appear that the true katydid is either extinct or is rapidly becoming less common in most localities within the limits mentioned. From Mr. S. Harmsted Chubb of the American Museum of Natural History we learn that about four katydids were heard singing on the evening of October 6, 1919, in some tall trees a short distance west of Broadway at about 255th Street. This locality is near the northern limit of Van Cortlandt Park. In the collection of the American Museum of Natural History there are six specimens collected many years ago at West Farms, New York City, by John Angus. Owing to the fact that the true katydid is still so common on parts of Long Island, it may possibly be found in the eastern part of one of the boroughs of the greater city situated on that island.

It is to be regretted that but six specimens of *camellifolia* are preserved from Staten Island, where at one time the species was so abundant. Most of these were found on the trunks of trees after storms, for when the wind blows hard the katydid often descends to the main trunk. They are easily collected where the forest growth is low, as at Lakehurst, N. J., for instance, by following up the song of the male and locating the insect with the aid of an acetylene lantern. Then if the katydid is gently touched with a long stick, it will let go its hold and fall to the shrubbery below. Mr. George P. Engelhardt and I have thus collected many. The insect, however, will not let go its hold if the trees are simply shaken: it has to be touched.

While the true katydid does not often frequent the tops of pitch pines, it does lay its eggs in the bark of that tree, and we have photo-

graphed a female while so engaged, and seen a number of others, especially in the mixed woods of pines and oaks on Long Island, N. Y. Many lay their eggs during the latter part of September on Long Island, and it is then also that the males sing often in the daytime when the sunshine is warmest.

LEGS IN THE CARABIDÆ.

BY HOWARD NOTMAN,

BROOKLYN, N. Y.

The coxæ of the anterior and intermediate legs are globular in form and exhibit the same structure throughout the Carabidæ. The apex or upper end of the joint, viewing the beetle as it lies on its back, contains a circular cavity which holds the condyle of the trochanter. Adjoining this cavity on the outer side is another cavity or depression in the outer face of the coxa. This second cavity reaches the outer edge of the joint and is bounded by a more or less carinate edge except at the outer end where the carina is obliterated. Where the two adjoin, the wall of the central cavity is deeply emarginate. This structure gives the leg a greater radius of transverse motion and allows it to be drawn closer to the body in repose.

The anterior and posterior edges of the outer depression are not similar in form. The former, viewed from the front, is straight and continuous with the edge of the central cavity. The latter, viewed from the opposite direction, is strongly concave and elevated in a prominent blunt-pointed tooth where it joins the edge of the central cavity. This tooth is bent slightly over the condyle and strengthens the hold on the latter at the point where the emargination between the cavities tends to weaken it. Considering this to be a description of the anterior coxæ, the arrangement in the intermediate is exactly the reverse; that is, the tooth is on the anterior edge and the posterior edge is straight. When it is considered that the anterior legs are used chiefly to pull the beetle forward and the intermediate to push it in the same direction, the reason for the opposite arrangement is explained and it seems probable that the tooth not only

strengthens the hold on the condyle but also serves as a fulcrum in the motion of leg. The tooth on the intermediate coxæ is not so strong not much more than a distinct angulation.

While the anterior and intermediate coxæ are condyles held by the sternal plates; the posterior are plates, being immovable. The upper surface, which is in the plane of the metasternum, corresponds with the anterior surface of the other pairs; the apex and outer cavity are perpendicular to the plane of the body, and the posterior edge of both cavities is the suture between the coxæ and the first ventral segment.

The upper surface, called the coxal plate; is triangular in form with a rounded posterior apex, covering the base of the trochanter and restricting the hind legs to a forward and back motion like that in the swimming of a frog. The outer portion of the coxal plate conjointly with the under plate forms a point extending to the outer edge of the metasternum between the latter and the first ventral segment.

The coxal or upper plate is flat and extends from the center or near the center of the body to the outer edge of the metasternum. It is widest near the inner edge and tapers rapidly to the outer extremity. In its simplest form as found in *Dyschirius*, *Clivina* and *Bembidium*, it has an acute edge throughout which is margined on the outer half. It conceals entirely the vertical under plate when viewed from above. In this form the coxæ differ least from the anterior and intermediate pairs. It is also found in *Opisthius*, *Leistus*, *Promecognathus*, the Pogonini, four species of *Platynus*—*larvalis*, *caudatus*, *dissectus* and *pusillus*, in *Leptotrachelus*, *Casnonia ludoviciana* and *Zacotus*.

In most species of Carabidæ the upper plate is narrower externally and the under plate wider and oblique so that the latter is visible from above. In *Cychnus*, *Carabus*, *Calosoma*, *Galerita*, *Cymindis*, *Helluomorpha* and *Brachynus* the plates, which are of this type are separated by an entire carina. In general, however, the carina is lacking on the outer half of the coxæ and the plates are separated by a groove, the marginal groove of the upper plate. This groove also is lacking on the outer fourth or third in *Anomoglossus*, *Brachylobus*, and *Lachnocrepis*. In the remaining genera, including the three last named and a few species of *Cychnus*—*heros*, *elevatus*, *bi-*

carinatus, *lecontei*, and *Carabus—vinctus* and *limbatus*, the outer part of the coxæ is also flattened in part or wholly to the plane of the metasternum and ventral segments; sometimes only the extreme outer point as in the species of *Cychrus* and *Carabus* mentioned and most of *Pterostichus*, or a half of the outward extension as in the subgenus *Pœcilus* of the genus *Pterostichus*, in the subgenera *Amara* and *Celia* of the genus *Amara*, in the genera *Loxandrus*, *Diplochila* and *Dicælus*; or the whole of the extension as in *Chlanius*.

In general when the extension is flat, the outer part of the upper plate is very narrow, the dividing groove then being close to the metasternal suture. The extreme examples are found in the genera *Callida*, *Euproctus*, *Pinacodera* and *Onota*, in which the extension consists almost entirely of the lower plate. In these genera and *Chlanius*, therefore, is found the greatest dissimilarity in structure and function between the two front pairs and the posterior pair of coxæ.

Casnomia pennsylvanica and *Casnomia ludoviciana* show the greatest dissimilarity in the structure of the posterior coxæ to be found in two closely related species. In the former the under plate is very oblique and slightly flattened at the outer end, in the latter the under plate is vertical and invisible from above.

In the genus *Plochionus* the groove on the coxal extension is very close to the anterior margin near the middle of the coxa, but curves away from the margin at its outer extremity. This character is also found in a greater degree in the genus *Oödes*. In *Oödes amaroides*, *americanus* and *fluvialis* the groove resembles that found in *Plochionus*. In *Oödes elegans* the groove is sinuate; in *cupræus* the groove is in the form of a semicircle in its outer half; in *quatuordecimstriatus* the semicircle occupies the whole of the coxal extension. No known coxal structure could be represented by this groove, which, therefore, seems to have lost its character as an indicator of structure and become merely sculptural ornamentation, a fact which denotes a remote ancestry for the genus.

The trochanters of the anterior and intermediate legs like the coxæ are, with one known exception, invariable in form. They are short, connate with the femur and joined obliquely with it, their lower edge being prolonged. The apices are supported by short prominences in the basal edge of the femur. The joint is nearly rigid.

In the posterior trochanters the prolongation is much greater and free from the femur at its apical end. In *Omophron* and the Cychrini it is short, about one fifth the length of the femur, oval in form, with a strongly rounded end. In the remaining Carabinae, excepting the Scaritini, it varies from two sevenths to one third. In the Scaritini it is larger. In *Ardistomis* only is it as small as one third. In the other genera it varies from three sevenths to one half the length of the femur. In *Scarites* the apex is acute.

In the Harpalinae bisetosæ it varies from one fifth in *Platynus caudatus* to four fifths in the male of *Patrobis californicus*, in which species it is very acutely pointed. It is also acutely pointed in *Patrobis aterrimus*. Elsewhere in the subfamily it varies from one quarter to one third. In *Oödes americanus*, however, it is three sevenths the length of the femur. In the Harpalinae unisetosæ the trochanters are longer, three sevenths to one half in the majority.

The femora vary in size and shape, not only among the species but also in the three pairs of an individual, for the anterior femora are the shortest and stoutest and the posterior the longest and most slender. This difference in the three pairs is always distinct but is less in such narrow elongate species as *Pterostichus angustus* or *Zacotus matthewsii*. In the Cychrini, excepting the genus *Spharoderus*, the legs are very slender and even in thickness. Elsewhere the posterior femora are not only more slender but also more clavate in form.

In a large proportion of the species the femora are grooved for the reception of the tibiae when drawn in to the body. The grooves are always strongest at the apical end and are often confined to the apical one third or one half. The natural expectation would be to find the grooves strongest in those species with short, stout legs. This is not always the case, however. In *Promecognathus* the anterior femora are stout and ungrooved; in *Pasimachus* the anterior femora are very stout and the grooves are very faint; on the other hand, in the closely allied genus *Scarites* the grooves are strong. In the slender legged genus *Nebria* the species *ovipennis*, *metallica* and their allies have the femora strongly grooved, but in the species *pallipes*, *sahlbergi* and their allies, the femora are ungrooved. In *Pterostichus* the femora are stout and strongly grooved; in *Amara* the femora are somewhat less stout but no less strongly grooved.

In *Amara obesa* the anterior edge of the grooves on the anterior femora is sharply carinate from the apex for about four fifths the length of the joint; the posterior for one quarter only. In *Badister pulchellus* the anterior carina is still stronger and entire, ending on the center line of the joint. Unequal carination of the edge of the grooves is also found in *Loxandrus* and *Diplochila*. In the males of *Chlanius laticollis* the anterior carinae of the anterior femora end in a prominent acute tooth at less than one quarter from the base. The tooth is on the center line of the joint. The posterior carinae vanish a short distance in front of the tooth. In the males of *Chlanius prasinus* the edges of the grooves are not carinate; there is, however, a short, obtuse tooth, whose apex is carinate at about one third from the base. This tooth is not on the center line but anterior to it, on the edge of an evenly outlined groove. In *Chlanius ruficauda*, also, the edges of the grooves are not carinate. In the males of this species there is a short, acute tooth at one fourth from the base, situated as in *prasinus*. In *Nebria ovipennis* both edges of the anterior femoral grooves are carinate and unite in a distinct point at about one fourth from the base; in the closely allied *Nebria gebleri* both edges of the grooves are strongly carinate and entire to the basal margin, where they do not unite. In *Pachyteles testaceus*, a small species placed in the tribe Nomiini, there is a large, very acute tooth on the anterior edge of the femoral groove, about two fifths from the apex. Between the tooth and the apex the edge is not carinate. There is a strong carina, however, from the tooth to the base of the joint, which is continuous with the strongly compresso-carinate trochanter, the only instance known of a modification in the form of the latter.

The most important structural modification in the form of the tibiae is found in the interior groove of the anterior pair. In the Cychrini there is a long straight groove on the interior face, evanescent toward the base and widest and deepest at the apical margin between the two spurs. In *Nebria sahlbergi*, *Leistus ferrugineus* or *Calosoma calidum*, the groove is not straight, but curved apically against the posterior spur, which is slightly higher on the tibia than the other spur. The curve in the groove is still more pronounced in the genus *Blethisa*, and the groove instead of terminating on the apical margin of the tibia as in *Cychrus*, terminates in the lateral

margin, producing an emargination therein. In these genera and all the genera in which this emargination is strong, the posterior spur is found some distance above the apex: in *Thalpius pygmaeus* near the middle; in *Dyschirius tridentatus* nearer the base than the apex. In the remarkable genus *Metrius*, however, the posterior spur is terminal, although the groove is curved into the lateral margin and produces an emargination therein; and on the other hand, in *Omophron*, although the groove is straight as in the Cychrini, the posterior spur occupies a strongly ante-apical position. In *Pasimachus* the groove is replaced by a hemispherical excavation, which cuts the lateral margin close to the apex, between the base of the tarsi and the posterior spur, which is slightly ante-apical. In *Scarites* the excavation becomes an oblique transverse groove cutting both lateral margins of the joint. In this form it is found throughout the subfamily Harpalinæ.

The tibiæ are always thicker at the apex than at the base; sometimes only slightly so as in *Omophron* or *Brachynnus*; sometimes suddenly thicker at the apex as in the Scaritini, the genus *Pterostichus*, or the Dapti. The anterior pair are always thicker and shorter than the posterior.

Although the anterior pair are often strikingly modified with teeth and apical prolongations, as in the Scaritini and Dapti, the intermediate tibiæ in the majority of the genera are the most strongly modified with secondary sculptural ornamentation in the form of grooves, carinæ and spines.

In the intermediate and posterior tibiæ, some traces of a row of spines on each side, often accompanied by a distinct carination, is always found, excepting possibly in *Casnonia*, *Zuphium*, *Thalpius*, *Ega* and *Brachynnus*. On the exterior faces of these tibiæ is rarely found a simple longitudinal groove, stronger on the intermediate, as in *Leistus ferrugineus*. In *Nebria ovipennis* and *metallica* this groove is found on the intermediate tibiæ only, and is open at the apex. In *Platynus reflexus* a weak groove is found on the intermediate tibiæ only; it is placed near the middle; in the closely related *Platynus brunneomarginatus* intermediate and posterior tibiæ are both grooved, the groove extending nearly to the apex. In *Callida viridipennis* there are weak grooves near the apex on both pairs of tibiæ. The grooves are most strongly developed in *Platynus funebris*.

In place of the grooves, the intermediate and posterior tibiae may have a central longitudinal carina as in *Galerita decipiens* and in *Badister pulchellus*; in which case, the crest usually carries a row of coarse punctures bearing spinules. In *Lebia grandis* the exterior faces are compresso-carinate and the crest carries such a series. In *Helluomorpha bicolor* the whole tibia is compressed and the narrow external edge is sharply and deeply grooved. These grooves are open at the apex. The carinate edges are spinulose-punctate, more strongly in the intermediate pair. In the intermediate pair the punctures are exactly on the crest; in the posterior pair they are more on the outer side of the carinae. In *Philophuga viridicollis* both pairs of tibiae are grooved, but the limiting carinae are indistinct and the grooves are not open behind. The row of punctures on both pairs in this species are slightly off the crests. In *Tetragonoderus fasciatus* a row of spine-bearing punctures is found in an anterior position on the intermediate tibiae, though no groove is present. The corresponding posterior row is less numerous or entirely absent. In *Pterostichus stygicus*, *coracinus* and *mæstus* there is a row of three or four large punctures on the apical third of the intermediate tibiae. These are not on the center line but slightly anterior in position.

The antero-exterior apical margin of the intermediate tibiae in *Harpalus*, *Chlanius*, *Calosoma* or *Cychrus* bears a fringe of close-set spinules. In a male *Platynus angustatus* or a male *Pterostichus ater* this fringe is strongly arcuate, concave to the margin. The fringe does not mark an emargination, however, for the apex is entire beneath the fringe. In a male of *Pterostichus lucublandus* the feature is most strongly developed. In that species it is further removed from the apex, straight and free at both ends. In the males of the subgenus *Cyrtonotus* of the genus *Amara* the interior face of the intermediate tibiae is dentate or bisinuate; in the males of the genus *Discoderus* the tibiae are strongly arcuate and denticulate within.

The tarsi in the Carabidae are five-jointed and the last joint bears two claws at its apex. The first joint is always the longest, but in the Harpalinae unisetosae the difference between the first and second joints is sometimes not very great. In *Onota floridana*, on the other hand, the first joint of the posterior is equal in length to the next four. The tarsi of the posterior legs are always the longest and

those of the anterior the shortest. In the majority of the species the first joint is equal in length to the next two or three. The first is always wider at the base than the others. The joints of the anterior tarsi are more or less flattened and triangular in form and the joints of the posterior more or less cylindrical, excepting the tribe Dapti and the genus *Agonoderus*.

The fourth joint throughout the family is rarely more than slightly longer than wide, even in such long-legged species as *Scaphinotus angusticollis*, *Platynus caudatus* or *Platynus angustatus*. The genera *Lachnocrepis* and *Oödes* are exceptions. The legs in these genera are only moderately long, yet the fourth joint is distinctly elongate. In the subfamily Carabinae, except in the genus *Promecognathus* and the Harpalid genera *Nomius*, *Psydrus*, *Morio*, *Bembidium*, *Tachys* and *Trechus*, the fourth tarsal joint is not emarginate at apex. In the remaining genera the fourth joint at least is always more or less emarginate. In *Agonoderus* the fourth joint of the anterior tarsi only is emarginate, but usually the fourth joint of the posterior tarsi is not perceptibly less emarginate than that of the anterior.

In the males of the genus *Pterostichus* the first joint of the anterior tarsi is nearly as strongly emarginate as the fourth and the third is the least strongly emarginate. Elsewhere the third joint is sometimes very slightly emarginate in addition to the fourth, but the second and first are always truncate. In many genera of the Lebiini and the genus *Stenolophus* the fourth joint is bilobed; in *Stenolophus* only in the anterior and intermediate legs.

In the males of most of the genera of the family, the anterior tarsi have one or more dilated joints bearing squamulose hairs beneath. In *Omophron* the first joint only is dilated. In *Bembidium* and *Tachys* the first two joints are dilated. In most of the genera the first three joints are dilated. In *Tachycellus* the first dilated joint is slightly narrower than the second; in *Anisodactylus* it is still narrower; in the other genera the first is equal in width to or wider than the second joint. In the tribe Dapti and the genus *Agonoderus* the anterior tarsi are similar in both sexes. In the Cychrini, omitting the genus *Spharoderus*, and in the genus *Platynus* the anterior tarsal joints of the male are very slightly dilated.

In the genera *Bembidium*, *Tachys* and *Loxandrus* the inner angles

of two or three of the dilated basal joints are toothed or prolonged. In these species the squamules beneath are arranged symmetrically with the axis of the leg. In *Galerita* the angles are similarly prolonged and the two series of squamules beneath are directed toward the prolonged angle. The structure is similar in *Lebia grandis*, but in *Lebia pulchella* and *furcata* the joints are symmetrical, yet in these species also the double series of squamules, is directed toward the inner angles of the joints.

Although the intermediate tibiae are more strongly sculptured than the posterior, yet the reverse is the case in the tarsi. The sculpture of the tarsi, which is found in a few genera only, consists of longitudinal grooves, sometimes with an intervening carina. These are most highly developed in *Platynus funebris*, in which all the tarsal joints on the three pairs of legs are strongly grooved. Usually the anterior tarsi are ungrooved. In *Pterostichus lucublandus* all the tarsal joints of the posterior legs are grooved, but only the first three on the intermediate legs. In *Pterostichus mastus* or *patruelis* the first three joints of the posterior tarsi are grooved and the first two of the intermediate. However, when only the first or the first and second joints of the posterior tarsi are grooved, the same are grooved on the intermediate. In *Pterostichus coracinus* the first two joints are grooved on both pairs; in *Amara subaenea* the first one only.

The anterior trochanter and femur have setae bearing punctures on them which are often arranged in a distinct order. The trochanter invariably carries one seta on the under side near the femoral joint. The setae on the femur are usually disposed in longitudinal rows, often more or less irregular or indistinct. They are most strongly developed in the genus *Calosoma*. In that genus there is a longitudinal row of setae-bearing punctures on the anterior and posterior faces a little below the middle. The rows are about equal in numbers, varying from nine to twenty-nine. The row on the posterior face is continuous. It starts at the basal edge of the femur. The row on the anterior face is interrupted at about the basal one fourth. The punctures between the break and the basal edge are usually four or five in number and are arranged in an irregular group. An irregular group is rarely found on the other side of the break at the basal end of the row. In *Pasimachus* there is an irregular group of about six punctures on the anterior face

near the apex; on the posterior face there are one or two large punctures very close to the basal edge. These latter punctures are found in *Scarites*, *Dyschirius*, *Clivina* and *Aspidoglossa*. In *Anisodactylus piceus* there is an irregular group of eight to ten punctures near the apex on the anterior face. In other species of *Anisodactylus* there is a more or less distinct transverse row of three to four in this position. In *Cratacanthus* the row is more distinct.

In *Clivina*, *Aspidoglossa* and *Schizogenius* there is one large puncture at the middle of the posterior face.

In most of the genera the punctures of the posterior face are the more distinct. They are one at about the basal fourth at or below the middle; one at the middle at or near the lower edge; one at the apical fourth at or above the middle.

In *Calathus* and a number of genera in the Lebiini the tarsal claws are pectinate or serrate and in *Schizogenius* there is an appendage between the claws which may be comparable to similar appendages in other orders of insects.

The anterior or terminal spurs of the anterior tibiæ exhibit modifications in form in a number of the genera. They are slender and frequently straight in *Bembidium*, but elsewhere are more often thickened at base with a curved acuminate apex. In *Oödes cupreus* or *elegans* the apex is strongly curved. In some species of *Anisodactylus* and *Amara* the spurs are trifid; in other species of *Anisodactylus* they are dilated at base; and in others they are simple, moderately slender and nearly straight. In the Lebiini the spurs in the genera *Cymindis* and *Apenes* are moderately large; in *Tetragonoderus* and *Nemotarsus* they are long and slender; in the other genera they are very small and straight. They are also straight and slender in *Brachynus*.

MISCELLANEOUS NOTES.

Necrophorus Guttula Motsch and its color Varieties.—In his "Monograph of the North American Silphidæ," published in Trans. American Entomo. Soc., Vol. VIII, October, 1880, page 232, Dr. George Horn says regarding *Necrophorus guttula* Motsch, "The color of the elytra is extremely variable in this species, in the typical

form (*guttula*) the elytra are entirely black, excepting a small sub-humeral red spot. . . . A variety of this form also occurs with a red spot on the elytra posteriorly." As this variety is at present unnamed and hence may cause confusion, I propose for it the name Van Dykei, in honor of Dr. Edwin C. Van Dyke, who first sent me specimens of this insect. Another form not previously described also occurs with four red spots on the elytra, two on each elytron. For this form I propose the name *quadriguttata* to distinguish it from *hecate* Bland, the form with banded elytra.—JOHN W. ANGELL.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MINUTES OF DÉCEMBER 16.

A regular meeting of the New York Entomological Society was held in the American Museum of Natural History at 8:00 P.M., on December 16, 1919, President L. B. Woodruff in the chair, with fifteen members present.

Mr. Leng presented a photograph of Dr. David Sharp.

Mr. Comstock read a paper "Notes on Lepidoptera" which will be printed elsewhere.

Mr. Davis, under the title "Notes from Virginia," recalled his visit in June, 1919, to the home of Col. Wirt Robinson, at Wingina, and the pleasant rambles they had together through Nelson and Buckingham counties. Mingled with recollections of the people they had met and the general natural history they observed were many entomological notes. Among the beetles seen were *Ptosima gibbicollis* on red-bud, *Prionus laticollis* active, though a quarter of her abdomen was gone, *Cicindela unipunctata* along a path in the woods, *Phengodes larva* eating a millipede and *Arthromacra robinsoni*, which, Mr. Davis noted, appears to have a very limited distribution; among the butterflies were *Chlorippe celtis*, *Papilio turnus* black variety and very large, and *Eudamus cellus*, found almost exactly where it occurred in 1917. On June 27 the first specimens of *Cicindela rufiventris* were seen. This constitutes a definite date of appearance as the species had been diligently sought on previous dates. Of the cicadas, Mr. Davis noted *Tibicen pruinosus*, *T. lyricen*, *T. sayi*, *T. davisi* and the Orthopteron, *Atlanticus davisi*, so that both he and Col. Robinson were catching namesakes. He had interesting experiences also in courting honeybees and in capturing dragonflies including the rare species *Neurocordulia obsoleta*. Mr. Davis illustrated his account of his visit by maps, photographs and four large boxes of the insects of all orders that he had captured.

Mr. Burns contributed the following note on a Diopsid Fly on Staten Island: *Sphyracephala brevicornis* Say has been taken in a number of localities, but every occurrence of this rare fly should be noted. One specimen was taken near Richmond, S. I., New York, on May 23, 1919, by sweeping skunk cabbage along the borders of a brook.

MINUTES OF JANUARY 6.

A regular meeting of the New York Entomological Society was held at 8:00 P.M., on January 6, 1920, in the American Museum of Natural History, President L. B. Woodruff in the chair, with seventeen members and two visitors, Mr. E. A. Chapin and Miss Campbell, present.

The Nominating Committee reported the following nominations for officers for 1920: *President*, L. B. Woodruff; *Vice-President*, J. D. Sherman, Jr.; *Secretary*, Chas. W. Leng; *Treasurer*, Wm. T. Davis; *Librarian*, Frank E. Watson; *Curator*, A. J. Mutchler; *Executive Committee*, H. G. Barber, Jos. Bequaert, Geo. P. Engelhardt, H. B. Weiss, C. E. Olsen; *Publication*, Howard Notman, W. P. Comstock, F. E. Lutz, Chas. Schaeffer; *Delegate to New York Academy of Sciences*, W. T. Davis. There being no other nominations, the Secretary was instructed to cast one affirmative ballot.

Letters from W. C. Dukes, Mobile, Ala., and Rev. H. I. J. Bodley, of Australia, were read.

Dr. Howard's election as president A. A. A. S. was noted, also his election as president of the Entomological Society of America.

A photograph of Mr. Woodruff was presented.

Dr. Bequaert spoke on "Predaceous Enemies of Ants," including other insects, toads, birds, mammals, showing specimens and photographs. His paper will later be printed in full.

It was discussed by Messrs. Comstock, Hallinan, Davis and Weiss.

Mr. Leng read some extracts from the Bulletin of the Entomological Society of France, of 50 years ago, showing similarity between their meetings and our own.

Mr. Chapin spoke of there being possibly too much importance attached to human tastes in studying insects, for it was rash to assume that our tastes and those of insects were identical.

Mr. Woodruff exhibited *Telephorus carolinus* and the newly described allied species *T. neglectus* Fall, pointing out the differences in size and antennal structure. The specimens of *neglectus* came from L. I.

MINUTES OF JANUARY 20.

A regular meeting of the New York Entomological Society was held at 8:00 P.M., on January 20, in the American Museum of Natural History, President L. B. Woodruff in the chair, with seventeen members and three visitors present, including Professor H. C. Fall.

Mr. Adolf Recht, 430 E. 67th St., was elected a member.

Mr. Bischoff exhibited his collection on the genera *Phytonomus* and *Ceutorhynchus*, calling attention especially to his capture of *Phytonomus eximius* at Caldwell, N. J.; where it was abundant on leaves of water dock. He pointed out also how certain species of both genera were found only in low ground and some that feed on plants of low growth cannot usually be taken by sweeping as the net passes over such plants.

Dr. Sturtevant exhibited living specimens of various species of *Drosophila* with enlarged colored drawings of each and discussed the distribution especially of introduced species, saying in part: "There are many species of animals that are 'weed-like,' in that they are much commoner about houses or stables than in woods or remote places. These forms are usually widely distributed, and are in general open to suspicion of being introduced species. In the Dipterous genus *Drosophila* there are, in this region, seven such species. Five of these (*D. funebris*, *D. busckii*, *D. melanogaster*, *D. repleta*, and an undescribed species) are cosmopolitan or nearly so. Of these, *D. funebris* was the only one known from this country to Loew, Say, Harris or Fitch. The other four have probably been introduced since the time of these entomologists. The earliest dates for this region and for the rest of the world with respect to these five species were discussed, as throwing light on the possible sources from which they might have come. The other two Nearctic 'weed-like' species, both undescribed, range from New England to South America, and have probably been introduced from the American tropics. All these species breed on fruit or on decaying vegetable material, so that they might easily have been accidentally imported. In fact, there can be no doubt that some of these, as well as at least four other species common in the tropics about fruit, especially bananas, are constantly being imported. The four last mentioned tropical species have never been taken in the northern states, though two of them are established in southern Florida. Apparently they are unable to thrive in a region where the winters are cold."

Mr. Notman exhibited new species of *Bembidion*, found last summer in the Adirondacks at elevated places near Mr. Marcy, describing especially the beaver meadows in which he has collected and the characters of the new species and their nearest allies. These descriptions will be printed in the JOURNAL.

Mr. Fall, present as a visitor, referred to previous taxonomic work in the genus *Bembidion*, and the danger of working from uniques or small series, especially if previously described forms were not recognized.

Mr. Davis and Dr. Bequaert referred to much successful taxonomy having been done under such conditions.

Mr. Davis read an interesting letter from our member, L. R. Reynolds, now in Mexico, and Mr. Sherman spoke also of Mr. Reynolds' letters to him.

Mr. Weiss distributed specimens of *Rhipidandrus paradoxus*, which he had bred from fungus.

Mr. Fall spoke briefly of the work he was doing in the genus *Hydroporus*.

MINUTES OF FEBRUARY 3.

A regular meeting of the New York Entomological Society was held at 8:00 P.M., on February 3, 1920, in the American Museum of Natural History, President L. B. Woodruff in the chair, with seventeen members present.

Mr. Notman, as chairman of the Publication Committee, reported the resignation of Charles Schaeffer as editor and his own election as his successor.

On motion of Mr. Leng, the Society recorded a vote of thanks to Mr. Schaeffer for his long years of service and splendid results.

Letters from Dr. Walther Horn and Colonel Casey were read.

Mr. Weiss read a paper on "Coleoptera of the Evening Primrose" which will be published elsewhere. He showed the adults and larvæ and their work.

Mr. Bischoff exhibited "Local Species of *Anthonomus*," 21 already listed in "Insects of N. J." and five additional, viz.: *A. rufipennis*, *A. likensis*, *A. molochnikus*, *A. hamamelidis*, *A. robinsoni*. He gave also copious notes on the conditions under which each species was found.

Dr. Lutz read some extracts from "Philippine Wasp Studies" by F. X. Williams, being Bull. 14, Report of work of the Exp. Sta. Hawaiian Sugar Planters Association, praising it highly.

Dr. Bequaert also praised the work, referring particularly to the interesting account of *Stenogaster* and the evidence adduced that wasps learn something by personal experience.

JOURNAL

OF THE

New York Entomological Society.

VOL. XXVIII.

JUNE, 1920

No. 2

NORTH AMERICAN CICADAS BELONGING TO THE GENERA PLATYPEDIA AND MELAMPSALTA.

By WM. T. DAVIS,

NEW BRIGHTON, STATEN ISLAND, N. Y.

The genus *Platypedia* was described by Uhler in *Entomologica Americana*, Vol. IV, p. 23, April, 1888, and *Cicada arcolata* Uhler, 1861, and *Cicada putnami* Uhler, 1877, were cited as belonging to the group. The original description of the genus is as follows: "Elongate, acutely tapering posteriorly, with a sub-carinate ridge on the tergum, extending from near the base to beyond the middle; wing-covers when at rest almost vertical. Head bluntly triangular, hirsute, the vertex gently sloping, almost as long as the pronotum, with the transverse sulcus deep and direct, not triangularly parted; the anterior ocellus placed in a longitudinal groove, which latter is continued upon the turmid front; front quite prominent, strongly convex; exterior cheeks long and narrow; supra-antennal plates narrow, thick, bounded each side by a notch. Pronotum short, moderately hirsute, with the dorsal surface feebly convex, not corrugated, but with two oblique grooves each side, the lateral margins almost straight, with the anterior angles feebly reflexed, and the posterior angles narrowly, but abruptly turned up; epipleural flaps as long as the pronotum, broadly crescentiform, but a little triangularly produced obliquely backwards and downwards. Anterior femora short and stout, swollen in the middle, grooved on the outside near the tip. Wing-covers wide, strongly bowed on the costal margin, the areoles large and mostly

wide, basal areole oblong, the radial areole occupying more than one-half the length of the wing-cover, the second ulnar areole short, wide, almost triangular; the apical areoles narrow, and the third, fourth, and sixth of equal length, with their inner tip triangular, while the inner end of the second, fifth, and seventh is truncated; wings narrow, not reaching as far as the tip of the discoidal areole of the hemelytra, with the anal-flaps broadly rounded, and separated by a deep emargination from the other member of the wing. Anal segment of both sexes narrow and compressed, acutely tapering, with the ovipositor of the female almost enclosed therein. Sonorous valves of the male rudimentary, inconspicuous."

To the above description may be added that owing to the great length of the radial cell the node is much nearer the end of the fore wing than in any other genus of North American Cicadas. In *Platypedia*, as in *Clidophleps*, *Okanagana*, *Okanagodes* and *Tibicinoides*, the metanotum is conspicuous behind the mesonotum, and the uncus cannot be withdrawn into the abdomen.

In August, 1888, Uhler described *Platypedia minor* in *Entomologica Americana*, which made the third species of the genus. Then followed three more, namely *aperta*, *intermedia* and *ampliata*, described by Mr. Edward P. Van Duzee, in 1915 in the *Journal of the N. Y. Entomological Society*.

In his *Synonymic Catalogue of Homoptera*, Part 1, Cicadidae, 1906, W. L. Distant designated *arcolata* as the type of the genus and places *putnami* as a synonym of that species. He recognizes *minor* as a valid species. In the *Catalogue of the Hemiptera of America North of Mexico*, 1917, Mr. Van Duzee lists the six species mentioned above, and gives *arcolata* as the logotype of the genus.

As far as known no species of *Platypedia* occur east of the Mississippi River, but from western Nebraska and Colorado westward to the Pacific, and southward to the Rio Grande there are at least ten species, and two species in the allied genus *Neoplatypedia*. In the *Annals of the Entomological Society of America*, Vol. XII, pp. 1-12, 1919, Dr. Edwin C. Van Dyke has an article on The Distribution of Insects in Western North America, and an examination of the localities given for several species of Cicadas mentioned in this paper, suggests that some are confined to the faunal areas defined in the article

referred to. In time, as more is learned concerning the distribution of Cicadas, this will no doubt prove to be the case.

In the following pages each species is considered separately, and all specimens mentioned are in the writer's collection unless otherwise stated. I am under obligations to a number of entomologists and various institutions for the privilege of examining specimens, or for material received, and acknowledgment is made in connection with the notes on each species.

A useful table for the determination of several of the species of *Platypedia* will be found in Mr. Van Duzee's Preliminary Review of the West Coast Cicadidæ, Journal N. Y. Entomological Society, Vol. XXIII, March, 1915. That author makes the helpful statement that, "Normally all our species of *Platypedia* have the following pale markings: Sides of the face, supra-antennal plates in part, median line and hind edge of the pronotum, hind margin of the metanotum including the posterior one half of the elevated X, the costal nervure as far as the node and the propleura superiorly."

We would like again to emphasize the importance of stretching the specimens, or at least the two wings on the left hand side of the body, so that the characters can be more plainly seen. The membranes at the base of the wings in *Platypedia* and *Neoplatypedia* are often colored in a manner useful in the determination of species, and this character can hardly be seen when the wings are closed. The reproduced photographs on the plate accompanying this article serve to illustrate the size, venation, and general shape of wings and body, but they do not show the often very beautiful and strikingly contrasted colors exhibited by some of the species.

KEY TO THE GENERA AND SPECIES OF PLATYPEDIA AND NEOPLATYPEDIA.

Apical cells of fore wing eight; costal vein of fore wings evenly curved except in *Platypedia barbata*, where it is somewhat suddenly bent. A ventral view shows the underside of the abdomen not hidden by the closed wings.

Platypedia Uhler.

Apical cells of fore wing seven; costal vein of fore wings expanded and conspicuously bent beyond the middle of the radial cell. In ventral view the apical portion of the underside of the abdomen is hidden if the wings are closed *Neoplatypedia* new genus.

Genus *Platypedia* Uhler.

A. Fore wings more than twice as long as broad.

B. Large, expanding 40 millimeters or over; uncus when viewed from above long and narrow.

C. Head narrow across eyes with front strongly produced.

D. Uncus viewed in profile very thin and flattened at the extremity.

Body black, head and thorax dull, abdomen shining, reflections bluish black; fore femora entirely black, pale at extremities; membranes at base of fore wings orange. Expands about 44 millimeters. Occurs in Arizona, Colorado, New Mexico *mohavensis* new species.

DD. Uncus viewed in profile slightly arched above, sinuate beneath, extremity not flattened as in *mohavensis*.

Body blue black, particularly the head and thorax; fore femora chestnut colored above, paler at extremities; membranes at base of fore wings bright orange. Expands about 40 millimeters. Occurs in California... *rufipes* new species.

CC. Head broader across the eyes with front not as strongly produced.

Uncus viewed in profile arched at top, the arch extending to the extremity, which is thickened; uncus also deepened near the base in typical *putnami* and *areolata*.

E. Body black with bluish reflections especially on the pronotum and mesonotum. Fore femora in mature individuals entirely black, pale at extremities, except in variety *occidentalis* of *putnami* which has chestnut colored fore femora. Vein separating radial cell from ulnar cells black throughout its length in mature individuals.

Costal margin of fore wings to end of radial cell brilliant orange; membranes at base of fore wings bright orange or blood red. Uncus viewed in profile with distal two thirds of lower line not straight, but curved so that the extremity sometimes appears bent downward. Expands about 50 millimeters. Occurs in Colorado, Nebraska, New Mexico, Nevada, California *putnami* (Uhler).

Body blue-black and marked as in typical *putnami* except the legs which are pale, the fore femora not blackened above, and the other legs also almost wholly chestnut colored. Occurs in western California.

putnami var. *occidentalis* new variety.

Body blue black but duller than in *putnami*. Costal margin of fore wings to end of radial cell, and membranes at base of fore wings orange. Expands about 53 millimeters. Occurs in Utah, Montana, Arizona, Wyoming.

putnami var. *lutea* new variety.

Body almost black, bluish reflections faint. Membranes at base of fore wings pale, often almost white. Uncus viewed in profile arched at top, and usually with distal two thirds of lower line but slightly curved. Expands from 48 to 54 millimeters. Northern California, Oregon.

putnami var. *keddiensis* new variety.

EE. Body black with brassy or greenish reflections. Fore femora almost entirely chestnut colored. Membranes at base of fore wings pale, often almost white. Vein separating radial cell from ulnar cells usually pale throughout its length.

Uncus viewed in profile arched at top, distal two thirds of lower line not straight but curved so that the extremity sometimes appears bent downward. Front of head usually quite hairy. Expands from 48 to 54 millimeters. Occurs in British Columbia, Washington, Oregon, California, Idaho, Montana *areolata* (Uhler).

Uncus viewed in profile arched at top but more suddenly declivitous near the tip than in *areolata*; distal two thirds of lower line straight or nearly so with a subapical sinuation. Veins of fore wings almost entirely pale, except those surrounding the first and second ulnar areas, and the first seven apical areas, which are black or nearly so. Expands from 40 to 44 millimeters. Occurs in California.

similis new species.

Uncus when viewed in profile evenly arched at top, and with lower line straight for part of its length before the hooked extremity. Hairs on front of head long and conspicuous. Costal margin of fore wings chestnut colored. Expands 45 millimeters. Occurs in Texas *falcata* new species.

BB. Small, expanding about 38 millimeters; uncus when viewed from above broadly ovate. Fore wing 17×6.5 mm.

Uncus when viewed from above "nearly as broad as long, with its apex subacute." Last ventral segment in female with notch broadly V-shaped. Membranes at base of fore wings pale orange. Expands about 38 millimeters. Occurs in California *aperta* Van Duzee.

AA. Fore wings much broader, the breadth being equal to about one half the distance from the basal cell to the apex of the wing.

Uncus when viewed from above broadly lanceolate and subacute at apex, its width almost half the length, Last ventral segment in female with notch more narrowly V-shaped, than in *aperta*. Membranes at base of fore wings orange. Expands about 36 millimeters. Occurs in California and Nevada *vanduzeei* new species.

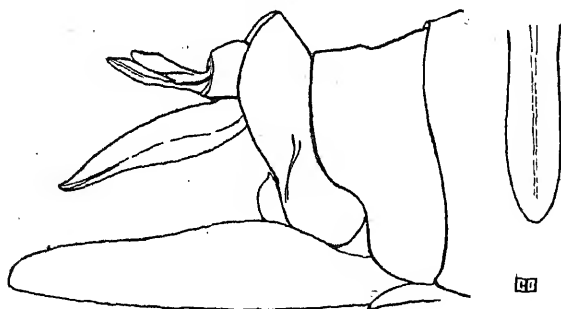
Uncus when viewed from above long and slender; seen in profile nearly straight below, arched above. Last ventral segment in female with notch

V-shaped. Membranes at base of fore wings almost white. Fore wings proportionately broader than in *vanduseei*. Expands about 41 millimeters. Occurs in California, Nevada, Colorado.....*minor* Uhler. Uncus when viewed from above narrow; when seen in profile somewhat resembling in shape that of *putnami*. Last ventral segment in female with notch U-shaped. Costal margin of fore wing slightly bent near the end of the radial cell. Membranes at base of fore wings red. Expands about 38 millimeters. Occurs in California.....*barbata* new species.

Platypedia mohavensis new species. Plate V, fig. 1.

Type male and allotype female, from Trumble Mountain, Mohave Co., Arizona, 1919 (J. A. Crosby). Davis collection.

Resembles *Platypedia putnami*, but is much slimmer, has a narrower head, and very protruding front. The uncus in *putnami* is large and has a dorsal ridge extending to the thick rounded point; in *mohavensis* it is much smaller, the dorsal ridge is low or almost absent, and does not extend to the thin and flattened rounded extremity. Last ventral segment of the male narrow and rounded at apex; valve not as long as in *putnami*, but of the same general shape. Last ventral segment in the female with the notch narrower than in



PLATYPEDIA MOHAVENSIS

putnami, which results in the extremities on each side of the notch being much more broadly rounded.

The body is dull blue-black covered in greater part with white hairs, which are particularly long behind the eyes, about the mesonotal X, and especially so beneath. The following markings are orange: supra-antennal plates in part, a small dot at the base of the vertex continued as a median line on the pronotum, which, however, does not reach the orange colored hind margin or collar; hind margin of the mesonotum including only part of the mesonotal X, and hind margin of the metanotum. Membrane at base of fore wings orange, also the costal margin to end of radial cell, remainder of venation black or nearly so. Veins of the hind wings pale except about the apical cells. The

femora are blackened above in the middle and hind legs except at the extremities, while in the fore legs they are entirely black except at the extremities. The mercanthi are long and pointed, orange in color.

MEASUREMENTS IN MILLIMETERS.

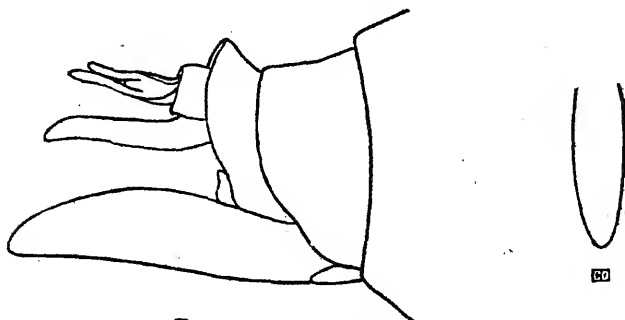
| | Male Type. | Female Allotype. |
|---------------------------------|------------|------------------|
| Length of body | 21 | 19 |
| Width of head across eyes | 5 | 5 |
| Expanse of fore wings | 45 | 45 |
| Length of valve | 5.5 | |

In addition to the type and allotype there have been examined twenty-nine males and twenty-nine females from Trumble Mountain, Mohave Co., Arizona, collected by Mr. J. A. Crosby in the spring or early summer of 1919. In this long series the colors are exactly as in the type and allotype.

Stockton, Utah, May, 1916, male (Tom Spalding).

Bondad, Colorado, June 27, 1919, about 6,100 ft., male and three females (Dr. F. E. Lutz), collection American Museum of Natural History.

Chaves, New Mexico, female (from Prof. H. F. Wickham).



PLATYPEDIA RUFIPES

In the Utah, Colorado and New Mexico specimens, the color at the base of both pairs of wings is of a slightly darker orange than in the types.

Platypedia rufipes new species. Plate V, fig. 2.

Type male and allotype female, from Los Angeles Co., California, May (Coquillett). Collection U. S. National Museum.

Resembles *Platypedia mohavensis* in having a relatively small head and protruding front. The uncus is bent downward at the extremity, slightly ridged on the dorsal surface; when seen in profile the lower line is sinuate and the basal third is without the deepened area to be found in *putnami* and *areolata*. Last ventral segment of the male rounded at apex; valve shorter and more robust than in *mohavensis*. Last ventral segment in the female with the notch somewhat U-shaped and in form about as in *mohavensis*, that is not as broadly open as in *areolata* and *putnami*. The pale markings of the body are those common to the genus, as already mentioned. In *mohavensis* the venation of the fore wings is almost entirely black except the costal margin to the end of the radial area, while in the present species the vein separating the ulnar areas from the radial area is orange; the veins surrounding the last two ulnar areas are also almost wholly orange, while the veins surrounding the marginal areas are nearly all black. The membranes at the base of the fore wings are bright orange. The venation of the hind wings is pale, except about the marginal areas, where it is nearly entirely black.

MEASUREMENTS IN MILLIMETERS.

| | Male Type. | Female Allotype. |
|---------------------------------|------------|------------------|
| Length of body | 18.5 | 17.5 |
| Width of head across eyes | 5 | 5.25 |
| Expanse of fore wings | 40 | 42 |
| Length of valve | 3.5 | |

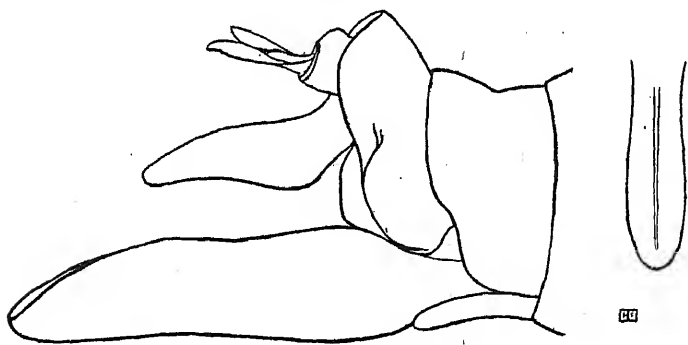
In addition to the type and allotype five females have been examined, collected in Los Angeles Co., California, May (Coquillett).

In the collection of the California Academy of Sciences there is a large male with wings expanding 52 millimeters, from Bear Lake, San Bernardino Mts., California, May 17, 1919 (J. O. Martin), that is considered here on account of the form of the uncus which resembles that of the type of *rufipes* except that it is much straighter along the lower line. The front of the head is prominent; the fore femora are chestnut colored, darkened beneath; femora of middle and hind pairs of legs striped with black; tibiæ blackened at the basal joints. The fore wings have the costal margin bright orange to the end of the radial cell, but the remainder of the venation is darker than in the seven specimens of *rufipes*. This insect may belong to a distinct species.

Platypedia putnami (Uhler). Plate V, fig. 3.

1877. *Cicada putnami* Uhler, Bulletin U. S. Geological and Geographical Survey of the Territories, iii, p. 455.

The original description of this species states that the head, pronotum and mesonotum are "blue-black"; the "hemelytra and wings hyaline . . . base, tegulae, and costal nervures orange, the latter long and broadly arcuated; the marginal nervure beyond the anastomosis and all the other nervules blackish-piceous." The legs are described as having the "femora broadly black on the upper, fore, and hinder sides; the anterior pair also black on the under side." "Length to end of genital sheath 21 millimeters; to tip of closed hemelytra 26 millimeters." In *Entomologica Americana*, Vol. IV, p. 23, April, 1888, Uhler says of *putnami*: "This species is generally of a bright steel blue color, distinctly marked with brilliant orange. It has been taken at Ogden, Utah, in Clear Creek Canyon, Col., and in several parts of the mountainous regions of Nevada." In the original description the types are said to have been "collected in the vicinity of Clear Creek, Colorado, by Mr. J. Duncan Putnam." The male figured



PLATYPEDIA PUTNAMI

on our plate came from Clear Creek Canyon, Colorado, about thirty-five miles west of Denver, from which Uhler's types also came. A male labeled "*Platypedia putnami* Uhler, Clear Creek, Col.," is in the Uhler collection, U. S. National Museum, and is, no doubt, one of the specimens from which the original description was made. A female from Ogden, Utah, is also in the Uhler collection and is probably the one referred to by him in 1888 as mentioned above. We, however, regard this as belonging to variety *lutea*.

Specimens have been examined as follows: Colorado.—Clear Creek, male and female (Oslar). Chimney Gulch, Golden, 7,500 ft., three males, four females without date, and male and female July 1, 1913 (Oslar). Bear Creek, Morrison, July 27, 1913, male and female (Oslar). Platte Canyon, 8,000 ft., July 10, 1913, male and five females (Oslar). Golden, June 26, 1911, male (E. A. Frost). Alamosa, June 21, 1912, male and three females (Oslar). Durango, May 27, 1912, male; June 3, 1912, female; June 10, 1912, male, and three males, two females without date (Oslar). Some of the specimens from Alamosa and Durango may be immature; the wings are not as clear as usual and the fore femora are not as black except in one male.

The following Colorado specimens are in the United States National Museum: Fort Collins, June 16, 1899, male; Canon City, male (Wickham); Chimney Gulch, May 13, 1901, female (Dyar and Caudell); Platte Canyon, May 25, 1901, female, and June 1, 1901, female (Dyar and Caudell); Boulder, June 3, 1901, male and female (Dyar and Caudell); Golden, June 5, 1901, female (Dyar and Caudell); Mill Gulch, Platte Canyon, May 30, 1919, male and four females (L. O. Jackson). In the collection of the Academy Natural Sciences of Philadelphia there is a specimen from Manitou, July 1.

In the American Museum of Natural History are the following Colorado specimens collected by Dr. Frank E. Lutz: Starkville, June 13, 1919, about 6,800 ft., thirteen males, nine females; Pagosa Springs, June 21–23, 1919, about 7,500 ft., male; Bondad, June 27, 1919, about 6,100 ft., male, two females; Mesa Verde, July 3–7, 1919, about 7,300 ft., three males, three females. Dr. Lutz noted in connection with those collected at Starkville, that their song was a “clicking sound; about eight clicks, rapid at first, but slowing.”

Nebraska.—Hat Creek Valley, Sioux Co., July, 1896, two males, two females (H. G. Barber), Davis collection, and two males, three females collected at the same place and time, H. G. Barber collection. Squaw Canyon, Sioux Co., June, 1896 (Barber), H. G. Barber collection. Mr. Barber writes that there were great numbers of *putnami* in western Nebraska where he collected in 1896. Monroe Canyon, Sioux Co., June, 1911, male and two females (R. W. Dawson). War Bonnet Canyon, Sioux Co., May 20, 1901, two males (L. Bruner), and June 27, 1911, three females (R. W. Dawson). Including those

just mentioned I have seen 118 specimens from Sioux Co. in the northwest corner of Nebraska, kindly sent to me for examination from the University of Nebraska. All show bluish reflections with red-orange markings including the costa to the end of the radial cell.

Nevada.—Four females labeled "Nevada" from collection University of Minnesota. These are typical *putnami*. In the Uhler collection, U. S. National Museum, there are nine females and two males labeled "Nevada" which also appear to be typical *putnami*.

New Mexico.—Jemez Springs, Sandoval County, 6,400 ft., collected by John Woodgate, May, 1916, fifty-two males, thirty-eight females; June, 1916, three males, five females; July, 1916, male and two females at 7,500 ft.; June, 1917, female, and June 7, 1917, female at 8,000 ft.; May, 1918, male; June, 1918, fifteen males, thirteen females; July, 1918, female; May, 1919, eight males, three females; June, 1919, twenty-six males and fifty-nine females. In 1916 Mr. Woodgate wrote "the cicadas of which I sent you so many specimens, swarmed everywhere here this summer." Cloudcroft, 9,000 ft., female (Warren Knaus). Box Canyon, June, 1912, female. Four miles southeast of Santa Fe, N. M., on the old Santa Fe trail, 7,000 ft., on scrub pine and cedar, June 15, 1918, male and three females (Warren Knaus). Mr. Knaus writes: "The small species did not attempt to fly, except an occasional short flight; did not sing, but made a *snap, snap, snap, snap*, noise." Ft. Wingate, May 4, 1908 (John Woodgate), collection Academy Natural Sciences of Philadelphia.

California.—Los Angeles County, two females without date (B. Neubarth). These specimens have the legs somewhat lighter colored than typical *putnami*. They expand 48 millimeters. In the absence of male specimens they are doubtfully placed here.

Mr. J. Duncan Putnam, after whom this species was named, was connected with the Davenport, Iowa, Academy of Natural Sciences, and in the proceedings of that society, Vol. II, 1876-1878, "*Cicada putnami* Uhler" is figured on plate IV, figs. 2 and 3, male and female. Figure 3 gives a side view with wings closed; figure 4, with wings expanded. It is stated that the figures were "Drawn and engraved on stone by Herman Strecker." The figures are not accompanied by any account of the species.

Platypedia putnami var. *occidentalis* new variety.

Type male and allotype female, Carrville, Trinity Co., California, June 21, 1913 (Dr. E. C. Van Dyke). Collection California Academy of Sciences.

This variety has the head and thorax blue-black, marked with brilliant orange as in typical *putnami*, but it is generally larger and has lighter colored legs. The front femora are not shining black with extremities pale as is the case with Nebraska, Colorado, Montana and New Mexico specimens of *putnami*, but with the exception of being slightly darkened beneath, the femora are entirely light chestnut colored or reddish orange. The fore wings have slightly yellowish reflections; costal margin is brilliant orange to the end of the radial cell, the remaining veins are black or nearly so, and the membranes at base are brilliant orange.

MEASUREMENTS IN MILLIMETERS.

| | Male Type. | Female Allotype. |
|---------------------------------|------------|------------------|
| Length of body | 22.5 | 21 |
| Width of head across eyes | 6.5 | 6.5 |
| Expanse of fore wings | 49 | 54 |
| Length of valve | 6 | |

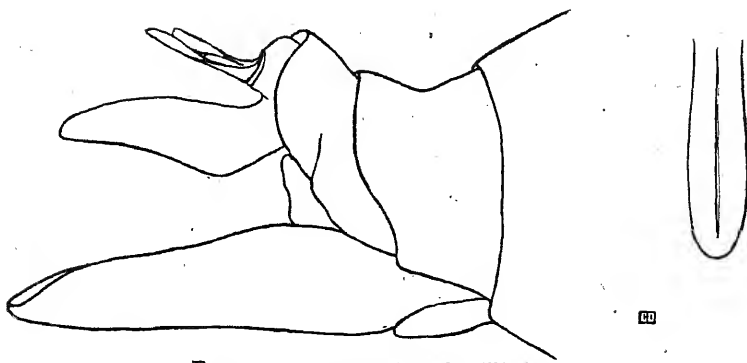
Specimens of this variety have been examined from the western part of California only. They are as follows:—Dunsmuir, Siskiyou Co., July 20, female (Dyar and Caudell); Navarro, Mendocino Co., June 7, female (Behrens), collection United States National Museum. Carrville, Trinity Co., June 1, 1913, male, and June 3, 1913, female (E. C. Van Dyke). Sonoma County, April, 1914, two females. Marin County, two females in collection American Museum of Natural History.

Platypedia putnami var. *lutea* new variety. Plate V, fig. 4.

Type male, State Canyon, Provo, Utah, July 7, 1916 (Tom Spalding). Davis collection.

Allotype female, State Canyon, Provo, Utah, July 1, 1916 (Tom Spalding). Davis collection.

This variety is blue-black but not so much so as in typical *putnami*, and has the lighter markings orange-yellow instead of the brilliant orange or blood-red of typical *putnami*. The fore femora are entirely black except the extremities, as in *putnami*. In Colorado and western Nebraska the colors of *putnami* are remarkable for their brilliancy, the membranes at the base of the fore wings are often of a blood-red, while further west true *putnami* is replaced in certain areas as in Utah by the present variety with orange-yellow markings, which contrast strongly with the somewhat dull blue-black of the greater part of the body.



PLATYPEDIA PUTNAMI VAR. LUTEA

MEASUREMENTS IN MILLIMETERS.

| | Male Type. | Female Allotype. |
|---------------------------------|------------|------------------|
| Length of body | 23 | 23 |
| Width of head across eyes | 6 | 7 |
| Expanse of fore wings | 53 | 59 |
| Length of valve | 6 | |

In the Uhler Collection, U. S. National Museum, there is a male of this variety from "Am. Fk. Can. Ut., June 23, 1891," labeled "*P. areolata* Uhl. Det. by Uhler," also a female of the same variety and from the same place and collected at the same time, labeled "*P. putnami* Uhl. Det. by Uhler." This goes to show that Uhler was uncertain about the form which we have here called *lutea*.

Other specimens examined are as follows:

Utah.—Ft. Douglas, July, two females (Prof. H. F. Wickham). Provo, June 4, 1910, two females; June 17, 1912, five males, one female (Tom Spalding). State Canyon, Provo, July, 1916, thirteen males, nine females; June 17, 1917, six males, two females; June, 1918, male (Tom Spalding). Stockton, May, 1916, female (Tom Spalding). Kaysville, Davis Co., June 23, 1912, two females (E. R. Kalmbach). Bellevue, Washington Co., 4,000 ft., June, 1917, male and female (G. P. Engelhardt), Davis collection, and same locality and date two males and a female, collection Museum Brooklyn Institute of Arts and Sciences. In the U. S. National Museum are the following:—Kamas, two females (H. E. Burke); Ogden, June 20, 1885,

male; "Utah," June 16, 1904; three females (S. L. Vail); Kaysville, June 23, 1912, two males (E. R. Kalmbach).

Wyoming.—Bridger Basin, male and female, collection Museum Comparative Zoology, Cambridge, Mass.

Montana.—Gallatin Co., 5,000 ft., July 10, 1902, male (R. Berston), Montana Agri. Experiment Station.

Arizona.—Top of Grand Canyon, June 6, 1916, male and three females (G. P. Engelhardt). Mohave Co., 1919, male (J. A. Crosby). Moran's Point, Grand Canyon, June, 1901, two females, collection Am. Museum of Natural History. Grand Canyon, June 16, 1907, 7,000 ft., male (H. A. Kaerber), collection Academy Natural Sciences of Philadelphia. Williams, May 26-28, four males (Barber and Schwarz), collection U. S. Nat. Museum.

Platypedia putnami var. *keddiensis* new variety.

Type male, Keddie, Plumas Co., California, May 16, 1919 (Mrs. Luman). Davis collection.

Allotype female, Keddie, Plumas Co., California, June, 1918 (Frank Morton Jones). Davis collection.

The front femora in this variety are black, except the distal extremities, and the vein separating the radial cell from the ulnar cells is black throughout its length. It is a darker form than *areolata* and the reflections are slightly



PLATYPEDIA PUTNAMI VAR. KEDDIENSIS

bluish in color. The membranes at the base of the fore wings are almost white as in typical *areolata*, not orange as in variety *lutea*, and the costal margin to the end of the radial cell shows a brownish tint, not the brilliant orange or reddish-orange of *putnami*, or the clear orange of variety *lutea*.

from Utah, Montana, and Arizona. The uncus approaches in shape that of *Platypedia similis* from further south.

MEASUREMENTS IN MILLIMETERS.

| | Male Type. | Female Allotype. |
|---------------------------------|------------|------------------|
| Length of body | 23 | 23 |
| Width of head across eyes | 6 | 6.5 |
| Expanse of fore wings | 49 | 52 |
| Length of valve | 5.5 | |

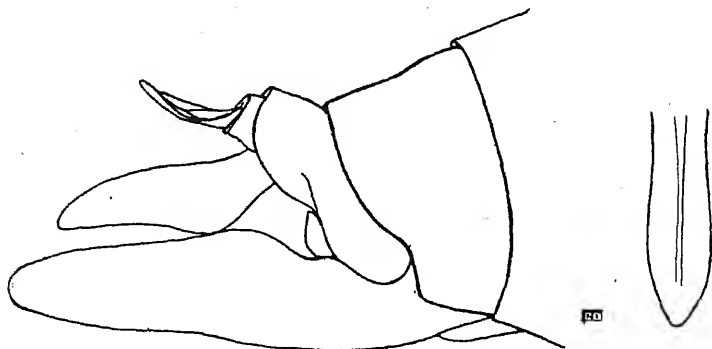
In addition to the type and allotype the following specimens have been examined, from California:—Keddie, Plumas Co., June 7, 1918, female, June 24, 1918, female, June 28, 1918, female (Frank Morton Jones); May 16, 1919, male (Mrs. Luman). Plumas County, June 14, 1913, female (F. W. Nunenmacher). Lassen County, June 5, 1913, male (F. W. Nunenmacher).

In the collection of the Colorado Agricultural College, there is a female labeled Corvallis, Oregon, July 8, 1896.

Platypedia areolata (Uhler). Plate V, fig. 5.

1861. *Cicada areolata* Uhler. Proceedings Academy Nat. Sciences of Philadelphia, xiii, p. 285.

In the original description the color is given as "black, with a slightly æneous tinge"; the "eyes very prominent"; the "hemelytra



PLATYPEDIA AREOLATA

broad, obtuse, dilated upon the costal margin to the tip of the first marginal areolet, costa and two posterior longitudinal veins at base, yellow, remainder of the veins piceous, veins of the wings yellow,

piceous at the tip, excepting the middle longitudinal one, which is piceous almost to the base"; the "legs orange, the anterior femora black beneath"; the "penis cover [uncus] is subfusiform, carinated above, and with an interrupted groove exterior to the concave sulcus present upon each side of the middle." The length is given as 21 millimeters, and the expanse as 50 millimeters. The type locality is given as "east of Fort Colville in Washington Territory." In the Uhler collection, U. S. National Museum there is a single female labeled "*Cicada areolata* Uhler, E. of Ft. Colville, N. W. Bound. Surv." This is no doubt one of the types mentioned in the original description. It expands 56 millimeters and the fore wings are 10 millimeters broad. The reflections are brassy. The fore legs are now missing, but we have Uhler's statement in the original description, "legs orange the anterior femora black beneath."

In the Bulletin of the U. S. Geological and Geographical Survey of the Territories, 1874-1875, Vol. I, p. 343, Uhler has this to say of the distribution of *areolata*: "Collected in Cache Valley, Utah, by C. Thomas, but previously known from San Mateo, Cal. (A. Agassiz); from Ogden, Utah; from Virginia City, Nev. (J. Behrens); and from Washington Territory." The Cache Valley and Ogden, Utah, specimens belonged probably to what is described in this paper as *putnami* var. *lutea*, and the San Mateo, California, material no doubt belonged to what we call *Platypedia similis*.

Specimens have been examined as follows:

British Columbia.—North Bend, June 6, 1892, two females, U. S. National Museum. Armstrong, July, 1914, male (W. Downes), collection Dept. of Agriculture Province of Nova Scotia. Lardo, Kootenay Lake, June 17, 1905, male (J. Chester Bradley), Cornell University.

Washington.—"Wash. T.," no date, female, collection U. S. National Museum. Logie Creek, Yakima Co., June 16, 1913, three males and two females (Clarence H. Kennedy). Concerning these specimens Mr. Kennedy writes as follows: "They were taken on alder, sumac and balsam trees along Logie Creek. Their call is not like the 17-year form, nor like the eastern harvest flies, but consists of just a few clicks. Until I stumbled on to one clicking it had not occurred to me that they were cicadas." One of the males from Yakima Co. is figured and genitalia drawn.

Oregon.—Dilley, female in the collection of the Museum Brooklyn Institute of Arts and Sciences, female in the writer's collection, and a male and female in the collection of H. G. Barber, all without date. Wilson, June 7, 1915, female (M. M. Rheer), Corvallis, May, 1901, male; May, 1908, female (Elta Baber); May 28, male (Mark Wright); June 5, 1912, male (L. G. Gentner); male without date (W. J. Chamberlin). Mary's Peak, Lincoln Co., May, three males and one female (W. J. Chamberlin). Odell, June 10, 1914, male. In the collection of the Oregon Agricultural College there is a long series of over forty specimens of *arcolata* which I have been permitted to examine through the courtesy of Prof. A. C. Lovett. Those from Corvallis range in date from April 1 (1897) to June 16 (1896). There is, however, a single male from Hood River, August 15, 1913, and another male labeled Philomarth, Sept. 14, 1906 (Schranck). Two females were collected in the Santiam National Forest, April 27, 1915, by W. J. Chamberlin.

Idaho.—Wallace, June 9, 1915, male, two females; May 2, 1916, male; May 3, 1916, male and female; May 23, 1916, female; May 31, 1916, female; June 9, 1916, female; May 8, 1917, male; May 9, 1917, male; May 14, 1917, three females; May 18, 1917, male; June 3, 1918, female; June 9, 1918, female; June 18, 1918, male; June 24, 1918, female; April 24, 1919, male; April 28, 1919, male; April 30, 1919, male; May 12, 1919, female; May 14, 1919, female; May 16, 1919, male and female; May 18, 1919, male; May 25, 1919, female; June 1, 1919, female; June 22, 1919, two females (Otto Huellemann). This long series of twelve males and nineteen females collected during the past five years by Mr. Huellemann show no variation. Mt. Moscow, female (Frank Magee). Moscow Mts., July 8, 1898, female, collection Am. Museum of Natural History. Troy, May 31, 1908, two females (E. T. Cresson, Jr.), collection Academy Natural Sciences, Philadelphia.

Montana.—Bonner, May 26, 1904, male, collection Brooklyn Institute of Arts and Sciences. Bear Dance, Flat Head Co., June 7, 1912, male. Four other specimens from Bear Dance, collected June 7, 1912, and two females from Thompson Falls, Missoula Co., are in the collection of the Montana Agricultural Experiment Station.

California.—Humboldt Co., May 22, 1911, male (F. W. Nunen-

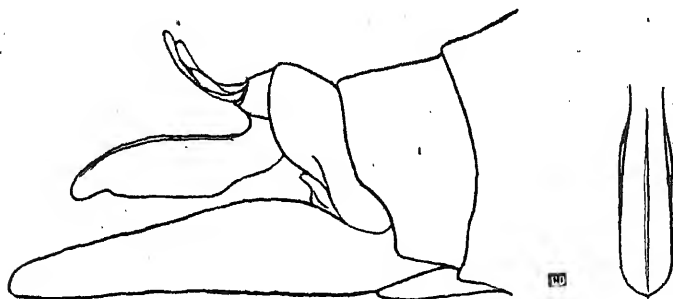
macher). Siskiyou Co., June 1, 1911, female (F. W. Nunenmacher). In the writer's collection there are also two males and three females collected in Mariposa Co., June 6 and 17, 1914, that may not be *areolata* as they are very much smaller, expanding from 40 to 46 millimeters.

Platypedia similis new species. Plate V, fig. 6.

Type male and allotype female from Sonoma Co., California, March 15, 1914. Davis collection.

Resembles *Platypedia areolata*, but is smaller and has a differently shaped uncus.

Shape of head as in *areolata*, except that the front is usually a little more prominent. The frontal sulcus is well defined and continuous, whereas in *areolata* it is interrupted at about the seventh or eighth transverse ridge, with the ridge itself often plainly continuing across the sulcus. The uncus is almost straight for the distal half or more of the lower line except for a subapical sinuation, while the dorsal arch is higher, also more suddenly declivitous at the extremity than in *areolata*. The last ventral segment in the male is not



PLATYPEDIA SIMILIS

as broadly rounded at the extremity as in *areolata*. The notch in the last ventral segment of the female is the same in both species, that is V-shaped.

The body is black with a brassy tinge, and the usual paler marks are yellowish orange as in *areolata*; the legs are almost wholly chestnut colored; the membranes at the base of the fore wings are almost white, and the venation of both pairs of wings, except about the marginal cells, is pale in the types. The collar or hind margin of pronotum is usually more broadly pale colored than in *areolata*.

MEASUREMENTS IN MILLIMETERS..

| | Male Type. | Female Allotype. |
|---------------------------------|------------|------------------|
| Length of body | 21.5 | 18 |
| Width of head across eyes | 5.5 | 5.5 |

| | | |
|-----------------------------|-----|----|
| Expanse of fore wings | 43 | 43 |
| Length of valve | 5.3 | |

In addition to the type and allotype specimens have been examined from numerous localities in California, which it will be noted are generally near the western part of the state and west of the Coast Range.

California.—Sonoma Co., February, 1913, male (Oslar); March 10, 1914, male and five females; March 15, 1914, two males; May 1, 1914, male and four females; April, two males, four females. Eldridge, Sonoma Co., April 19, 1917, three males. Sonoma Co., May 2, 1917, two males. San Mateo Co., June 8, 1917, two females (F. W. Nunenmacher). Crystal Lake, San Mateo Co., May 14, 1916, male (Dr. F. E. Blaisdell). Santa Cruz Co., April, 1917, male (E. R. Leach). Palo Alto, Santa Clara Co., May 26, 1914, male and female (Clarence H. Kennedy). Milpitas, Santa Clara Co., May 4, male (R. J. Smith), Havilah, Kern Co., June, 1913, female. Los Angeles, May 20, 1918, male, and Griffith Park, Los Angeles, May 13, 1918, male (Frank Morton Jones).

In the collection of the Museum of the Brooklyn Institute of Arts and Sciences, there is a male from Camp Taylor, Marin Co., California, June, 1906, in which the transverse rugæ, the femora, tibiæ and costal margin of the fore wings are of a red-orange color. The transverse rugæ are usually black in *similis*, but except in color the specimen appears to be a *similis*.

In Mr. E. P. Van Duzee's collection there are the following from Marin Co., California:—Lagunitas, March 9, 1913, male (Dr. E. C. Van Dyke); Mt. Tamalpais, May 7, 1911, female (Dr. E. C. Van Dyke).

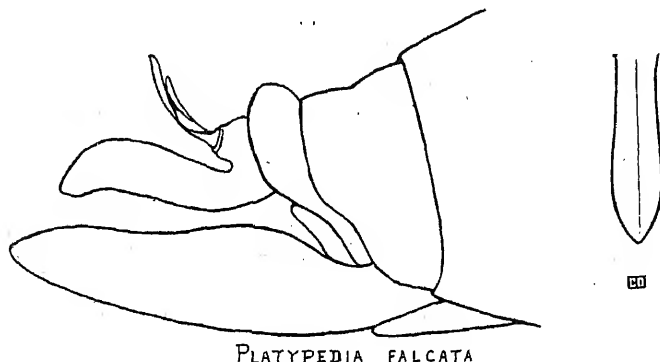
While this species resembles *areolata* in coloring, the uncus differs more in shape than does that of *areolata* from *putnami*. The form of the frontal sulcus also seems to be a good character whereby *similis* may be separated from *areolata*.

Platypedia falcata new species. Plate V, fig. 7.

Type male, El Paso, Texas, August (G. W. Dunn). Davis collection.

Head narrow across the eyes, front prominent and clothed with long black hairs on face with silvery hairs beneath the eyes. Top of head, pronotum and

mesonotum clothed with long black hairs. Beneath extremely hairy, the hairs light in color. The uncus much bent downward at extremity as shown in the illustration. The usual pale markings are present but are more chestnut colored than they commonly are. In the fore wings the costal margin to the end of the radial cell, likewise most of the venation except about the marginal cells is chestnut colored; the basal membranes are almost white. The femora



are chestnut colored, those of the first pair of legs blackish beneath, and of the other two pairs striped on the sides with black.

MEASUREMENTS IN MILLIMETERS.

| | Male Type. |
|---------------------------------|------------|
| Length of body | 20 |
| Width of head across eyes | 5.5 |
| Expanse of fore wings | 46 |
| Length of valve | 5 |

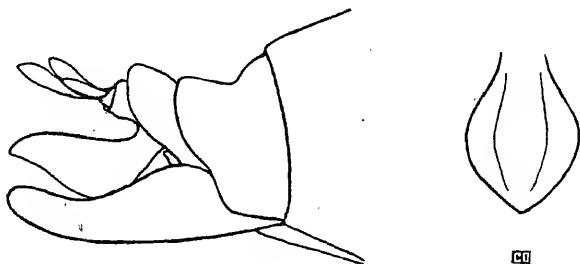
This species may be known from the other members of the genus by the differently shaped uncus, and the long stiff black hairs on the front of the head, and on other parts of the body. Only the type has so far been examined.

Platypedia aperta Van Duzee. Plate V, fig. 8.

1915. Journal N. Y. Entomological Society, XXIII, p. 29.

In the original description this species is said to be "about 16 mm. to tip of abdomen; with the elytral venation black and the inner margin of the second ulnar areole more rectilinear, scarcely more angled than in *areolata*." No other species of the genus so far ex-

amined has the uncus "nearly as broad as long," as it is in *aperta*. In the female the notch in the last ventral segment is broadly V-shaped. In this species the fore wings are of the same general shape as in



PLATYPEDIA APERTA

putnami and *areolata*, that is proportionately narrower than in *vanduzeei*, *minor* and *barbata*.

The species was described from seven males and two females taken by Mr. Van Duzee at Alpine, San Diego Co., California, June 8, 1913, and June 6, 1914, and one male from San Diego city, taken May 20, 1913. Three of the cotypes, taken on June 6, 1914, have been kindly contributed to the writer's collection by Mr. Van Duzee. The holotype, San Diego Co., Calif., June 8, 1913, male (E. P. Van Duzee), is figured on the plate. Prof. Wm. S. Wright has sent three females from San Diego, Calif., collected May 24, 1913.

Platypedia vanduzeei new species. Plate V, fig. 9.

Type male and allotype female, San Diego Co., California, March 22, 1914 (E. P. Van Duzee). Collection California Academy of Sciences.

Front of head moderately produced, with the sulcus distinct and the sides nearly parallel, not expanding below the middle as in *minor*. Head broader across the eyes than the front margin of the pronotum; sides of the pronotum nearly parallel until just before the posterior angles when the pronotum is suddenly widened at the collar. Body very hairy, the hairs on the head and pronotum darker than those on the rest of the body, especially on the under side, where they are almost white. Fore wings with the front margin evenly but considerably curved; the wings themselves are broader across the middle than in *aperta*. Uncus when viewed from above broadly lanceolate and subacute at apex, its width about half the length; seen in profile when raised above the valve it resembles the upturned head of a broad-headed snake. In the female the notch in the last ventral segment V-shaped.

General color bronze-black, the abdomen more shining. Membranes at base of fore wings orange; costal margin dull orange to end of radial cell; veins surrounding the apical areas of both pairs of wings black or nearly so. The pale marks on the body are those usual to the genus. The fore femora are black beneath, paler above, usually chestnut colored, sometimes striped.



MEASUREMENTS IN MILLIMETERS.

| | Male Type. | Female Allotype. |
|---------------------------------|------------|------------------|
| Length of body | 14 | 13.5 |
| Width of head across eyes | 4.5 | 4.5 |
| Expanse of fore wings | 35 | 36 |
| Length of valve | 2.5 | |

In addition to the type and allotype the following have been examined from California:—San Diego, May 5, 1891, three males, and May 10, 1891, one female (Dr. F. E. Blaisdell); San Diego County, March 22, 1914, four females (E. P. Van Duzee). In Mr. Van Duzee's collection there are three males and one female also collected by him in San Diego County, March 22, 1914. Los Angeles, 1887, male (Coquillett). Hills near Los Angeles, May 11, 1915, female (Alonzo Davis); Los Angeles, May 27, 1916, two males (Alonzo Davis). Griffith Park, Los Angeles, May 11, 1918, male and two females, and May 13, 1918, male (Frank Morton Jones). Pasadena, June 19, 1916, female and May, 1918, male (Alonzo Davis). Universal City, June 9, 1915, male (C. A. Hill). Santa Barbara, May 5, 1919, sixteen males and six females, May 20, 1919, four males and two females (F. E. Winters). "California," six males and four females.

Mr. Winters writes of the cicadas he collected at Santa Barbara as follows: "In the first week of May I caught my first cicadas on

the steep embankment of a hill road struck by the afternoon sun and protected by the hill and huge eucalyptus trees from the sea winds. They were sitting on wild anise or dill, preferring the stem about two feet from the ground. They were not very shy and picking them with my fingers I found the best method of collecting. Sweeping did not prove effective, for as soon as the outer branches of the wild anise, which reaches a height of three or four feet, were hit, they would let themselves drop before the main stem was reached by the net. They cling to the stem head up." The cicadas were confined to the before-mentioned embankment of the short hill road, about 300 yards in length, and Mr. Winters was unable to find a single specimen in any other locality. He continues: "Collected on the 20th inst. some more of the cicadas, six in all, but confined to one bush, and not a single one anywhere else."

In the Uhler collection, U. S. National Museum there is a single male labeled "Nevada."

This species is smaller than *minor* and resembles in size both *aperta* and *barbata*. From the former it differs in having broader fore wings and a narrower uncus; from *barbata* it may be told by the front margin of the fore wing having a more even curve, that is not as bent at the end of the radial cell, and by the shape of the uncus as figured. In the female the notch in the last ventral segment is not as broadly V-shaped as in *aperta*.

In his Preliminary Review of the West Coast Cicadidæ already referred to, Mr. Van Duzee writes of this species under the name of *minor* Uhler, as follows: "This distinct little species seems to be confined to the southern portion of the state where it is very abundant at times. It is found on grassy hillsides from the last of March to about the first of July where it may generally be found resting on the stems of the sage bush. It has a short peeping note which is difficult to locate."

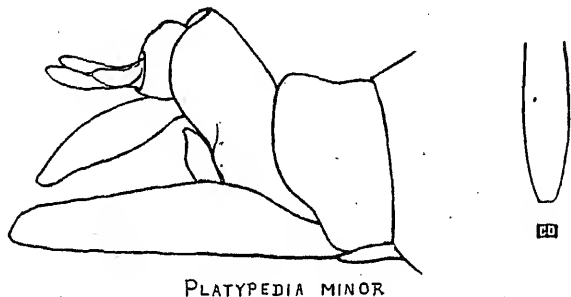
The reasons for having first identified this insect as *minor* Uhler, are considered in the remarks on that species.

Platypedia minor Uhler. Plate V, fig. 10.

1888. Entomologica Americana, IV, p. 81.

In the original description it is stated, "color a bronze-black, more highly polished upon the tergum than elsewhere; the surface, except-

ing the tergum and notum invested with long gray, or yellowish hairs and with white hairs around the meso-thoracic cross . . . front having the sulcus distinct from the base to below the middle, and thence expanding and becoming effaced, with the margins distinctly carinated, and the transverse grooves distinct . . . legs flavo-piceous, clothed with long remote white hairs and bristles, the coxæ, knees, and tarsi dark piceous. Wing-covers hyaline, somewhat tinged with fulvous at base, . . . membrane of base of wings and basal portion of nervures white." Length of body 16-17 mm.; to tip of closed wings 22-23 mm.; width of base of pronotum $5\frac{3}{4}$ -6 mm. The type material is said to be "Three specimens examined from Southern California," all males.



PLATYPEDIA MINOR

Recently the Uhler collection in the United States National Museum was examined to see if the three males used in the original description could be found. A male was discovered bearing three labels. The first reads "Cal. S."; the second "*Platypedia minor* Uhler, San Mateo," and the third "*Platypedia minor* Uhler, San Mateo, Det. Uhler." The fact that "Cal. S." is on this specimen would seem to indicate that it belonged to the type series, though San Mateo is only about half way down the coast of California. Though now old and slightly broken this insect answers Uhler's description. A figure of the specimen is given on our plate. The uncus is rather slender, nearly straight below, arcuated above.

In his note on *Platypedia minor*, Journal N. Y. Ento. Soc., Vol. XXIII, p. 28, 1915, Mr. Van Duzee stated that what he was identifying as *minor* was somewhat smaller than called for in the original description, and that the true *minor* might be one of the other species

mentioned in his paper. We now find this to be the case thus making *Platypedia intermedia* a synonym of *minor*. The statement by Uhler that his *minor* came from Southern California was misleading.

This insect seems to be very common in parts of California and numerous examples have been examined as follows:—Humboldt Co., May 15, 1911, female; May 22, 1911, female (F. W. Nunenmacher). Trinity Co., May 7, 1917, six males, four females; May 8, 1917, one male, three females; May 30, 1917, four males, five females (F. W. Nunenmacher); May 30, 1917, three females; April 18, 1918, male; June 16, 1918, male (E. R. Leach). Mendocino Co., May 10, 1919, six males and six females (E. R. Leach). Ukiah, Mendocino Co., April 23, 1919, six males, three females; April 30, 1919, four males, one female; May 2, 1919, male; May 6, 1919, three males, three females; May 26, 1919, male; May 27, 1919, nine males; May 30, 1919, two males and one female (Esther P. Hewlett). Sonoma Co., March 15, 1914, one male, four females; March 31, 1914, six males; April, 1914, three males, one female; May 1, 1914, two males, two females; May 5, 1914, two males; May 10, 1914, three males, two females; May 20, 1914, female. Eldridge, Sonoma Co., April 19, 1917, male; April 20, 1917, two females; April 28, 1917, one male, four females. Sonoma Co., May 2, 1917, five males, three females (J. A. Kusche) received through the kindness of Mr. Morgan Hebard. Fairfax, Marin Co., April 5, 1914, male; May 7, 1911, female (Dr. E. C. Van Dyke). Muir Woods, Marin Co., April 23, 1911, male (Dr. F. E. Blaisdell). Contra Costa Co., May 6, 1918, male (E. R. Leach). Mills College, Alameda Co., April 25, 1908. Alameda Co., May 20, 1909, female (F. W. Nunenmacher). Palo Alto, Santa Clara Co., six males, four females (Clarence H. Kennedy). Crystal Lake, San Mateo Co., May 7, 1916, male; May 14, 1916, female (Dr. F. E. Blaisdell). San Mateo Co., June 8, 1917, female (E. R. Leach). San Louis Obispo, April, female.

Through the courtesy of Mr. E. P. Van Duzee the writer has been enabled to examine the following from his collection:—Sobre Vista, Sonoma Co., Calif., May 12, 1910, male holotype of *intermedia* Van D.; Eldridge, Sonoma Co., Calif., May 15, 1914, male (J. A. Kusche); Fairfax, Marin Co., Calif., May 7, 1911, female (E. C. Van Dyke).

In the collection of the Dept. of Agriculture, Harrisburg, Pa.,

examined through the courtesy of Josef N. Knull, there are two males from Corte Madera, Marin Co., Calif., April 17, 1915.

In the United States National Museum there are the following from California:—Santa Cruz Mts., three males and a female; San Jose, male (A. E. Bush); Napa Co., female (J. J. Rivers).

In the Academy Natural Sciences, Philadelphia, there is a male from Mt. Diablo, Pine Canyon, California, May 10, 1893.

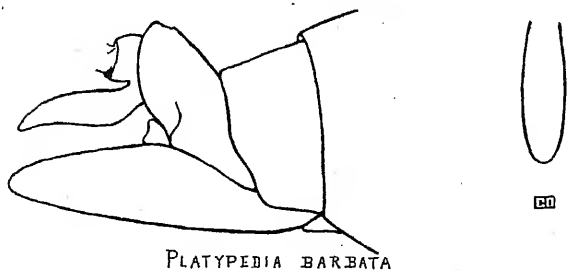
In the writer's collection there are twenty-two males and thirty-five females collected at Glenwood Springs, Colorado, June, 1919 (Oslar). Glenwood Springs is on the Grand River, one of the tributaries of the Colorado. We have also seen a female of this species from the collection of the University of Minnesota labeled Nevada. In the American Museum of Natural History there is a male labeled Mazatlan, Mexico. It is an old, discolored specimen, but the characters are all plain including the shape of the uncus. It appears to belong to the species under consideration.

Platypedia barbata new species. Plate V, fig. 11.

Type male and allotype female from San Louis Obispo, California, April. Davis collection.

Resembles *Platypedia vanduseei* in size, but may be separated by the broader fore wings which have the costal margin rather suddenly bent, and by the narrower uncus, as mentioned in the key.

Front of head moderately prominent, about as much so as in *vanduseei*; sides of pronotum not as parallel as in *vanduseei*, but somewhat converging



toward the eyes. Excepting the tergum the body is covered with long hairs both above and below, the hairs on the under side are white except on the face where they are almost black. The pale colors of the upper surface are those common to the genus, and as in *aperta* and *vanduseei*, except that the membranes at the base of the fore wings are more red than orange. Beneath the legs are mostly chestnut colored, the anterior femora darkened beneath

and all of the femora faintly striped. Tibiæ darkened at the knees. Uncus when viewed from above long and narrow, rounded at the extremity, faintly keeled near the base; seen in profile sinuate along the lower margin. Last ventral segment of the female allotype has the notch U-shaped, and not broadly V-shaped as in *aperta*, nor more narrowly V-shaped as in *vanduseei*.

MEASUREMENTS IN MILLIMETERS.

| | Male Type. | Female Allotype. |
|---------------------------------|------------|------------------|
| Length of body | 15.5 | 16 |
| Width of head across eyes | 4.75 | 5 |
| Expanse of fore wings | 36 | 40 |
| Length of valve | 3.5 | |

Only the type and allotype have so far been examined. Though it resembles *minor* in some features and *vanduseei* in others, this is a very distinct species.

Neoplatypedia new genus.

In this genus the front wings have seven apical areoles, instead of eight as in *Platypedia*, and the costal vein is strongly expanded and bent beyond the middle of the radial cell. When the insect is turned over, the wings, if closed, are seen to cover about the apical third of the abdomen; in *Platypedia* the entire under side of the abdomen is plainly in view. The uncus is remarkably long and upturned at the extremity. Type *Platypedia ampliata* Van Duzee.

Uncus when viewed from above slipper-shaped, the sides evenly converging to the rather sharp point; when seen in profile, the point rather suddenly upturned. Membranes at base of fore wings almost white. Expands 38 to 43 millimeters. Occurs in California.....*ampliata* (Van Duzee).

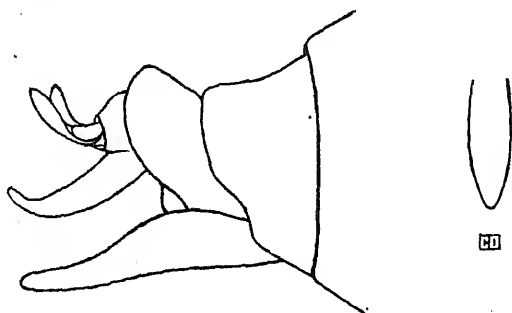
Uncus when viewed from above suddenly constricted at about one third of the distance from the rather sharp point; when seen in profile with the point gradually and moderately upturned, but not as much so as in *ampliata*. Membranes at base of fore wings orange. Expands 40 to 44 millimeters. Occurs in Arizona, Colorado, Utah, California.....*constricta* new species.

Neoplatypedia ampliata (Van Duzee). Plate V, fig. 12.

1915. *Platypedia ampliata* Van Duzee. Journal N. Y. Entomological Society, XXIII, p. 29.

The original description states that the remarkably broad fore wings are obviously angled beyond the middle of the costal areole, and that the costal nervure is broadly expanded, especially in the male, reaching a width of nearly one millimeter. Body clothed with long blackish hairs which become gray beneath and on either side of the mesonotal X. Front strongly produced; last ventral segment of the

male narrow and rounded at apex, valve moderately long and expanded at base; uncus lanceolate with the slender point upturned and attaining the apex of the valve. Last ventral segment of the female with a narrow subacute incision reaching nearly to its base. "Color black; supra antennal plates, a small dot at the base of the vertex con-



NEOPLATORYDIA AMPLIATA

tinued as a median line on the pronotum which does not reach the hind margin, narrow hind edge of the pronotum, sides of the mesonotal \times posteriorly, elytral nervures except close to their base, depressed sides of the pronotum and legs in part, pale." Length 16 mm., expanse 38 mm. The species was "described from one male without locality, in the collection of the University of California, and two females from Mary's River, Oregon, received from Dr. Wilson." Mr. Van Duzee has kindly sent me the male holotype for examination, and it is figured on the accompanying plate. It is immature which accounts for the costal nervure being so flattened out in mounting; usually it is stiffer and less pliable. The membranes at base of fore wings are white.

The following specimens have been examined:

Oregon.—Mary's River, female, collection Oregon Agricultural College. In this individual the notch in the last ventral segment is a "subacute incision" and narrower than in the twenty females of *constricta* examined from Arizona. It expands 38 mm.; membranes at base of fore wings yellowish white; fore femora black except at extremities.

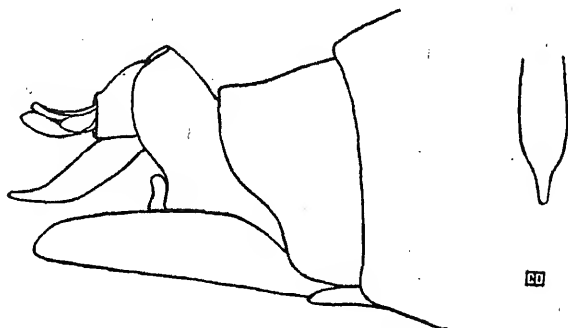
California.—Contra Costa Co., May 6, 1918, male. The genitalia of this specimen have been drawn by Mr. C. E. Olsen. The mem-

branes at the base of the fore wings are white. In the Am. Museum of Natural History there is a male labeled "California." The uncus is tapered gradually to the upturned point; membranes at base of fore wings white; fore femora black, upper surface with longitudinal chestnut colored stripes.

Neoplatypedia constricta new species. Plate V, fig. 13.

Type male and allotype female from Trumble Mountain, Mohave Co., Arizona, 1919 (J. A. Crosby). Davis collection.

Resembles *Neoplatypedia ampliata* in size and general coloring, but may be separated by the following characters: The uncus instead of being evenly narrowed to the extremity is constricted about one third of the distance from the tip; when seen in profile the uncus is not so suddenly upturned, and though bent upward the curve is more gradual. The head is narrower across the eyes than in *ampliata*. In the male the abdomen when viewed from above is



NEOPLATYPEDIA CONSTRICTA

rather suddenly constricted beyond the sixth segment, whereas in *ampliata* it tapers more evenly to the end of the body. In the female allotype the notch in the last ventral segment reaches nearly to the base of the segment and is wider open than the notch in the female *ampliata* examined from Mary's River, Oregon. Fore femora black or nearly so, except at the extremities. Membranes at base of fore wings orange; in *ampliata* they are white or yellowish white. The supra-antennal plates, a median line on the pronotum, narrow hind edge of the pronotum, and sides of the mesonotal \times posteriorly, are pale, as is usual in *Platypedia*.

MEASUREMENTS IN MILLIMETERS.

| | Male Type. | Female Allotype. |
|---------------------------------|------------|------------------|
| Length of body | 18 | 18 |
| Width of head across eyes | 5.25 | 6 |
| Expanse of fore wings | 42 | 44 |
| Length of valve | 4 | |

In addition to the type and allotype fifty-nine males and twenty females collected by J. A. Crosby at Trumble Mountain, Mohave Co., Arizona, in the spring or early summer of 1919, have been examined. The following have also been seen:—Stockton, Utah, May 16, 1916, female (Tom Spalding). Beaver Valley, Utah, male; South Creek, Beaver Co., Utah, male; Washington Co., Utah, June, 1917, male (G. P. Engelhardt), collection Museum Brooklyn Institute of Arts and Sciences.

Bondad, Colorado, June 27, 1919, about 6,100 ft., fifteen males, twenty-two females, collection Am. Museum of Natural History. When these specimens were collected by Dr. F. E. Lutz, he noted that they "sang *zip, zip, zip, zip* for a long time."

In the U. S. National Museum there is a male and female labeled Los Angeles Co., Cal., May (Coquillett). These are blue black in color, particularly the head, pronotum and mesonotum; the membranes at the base of fore wings are bright orange; the uncus in the male is constricted near the extremity, though not as much so as in the examples from Arizona, Utah and Colorado. The notch in the last ventral segment of the female is as wide as in the female allotype from Arizona. In the California Academy of Sciences there are two immature males from Bear Lake, San Bernardino Mountains, California; May 13, 1919 (J. O. Martin), which have the membranes at the base of the fore wings bright orange.

Genus *Melampsalta* Kolenati.

In Mr. Distant's Synonymic Catalogue of Homoptera, Part I, Cicadidae (1906), the type of the genus *Melampsalta* is given as *musiva* Germar, of the old world, and other species of the genus are recorded from continental Europe, Africa and Asia, also from Japan, Australia and New Zealand. One species is listed doubtfully from Surinam and *Melampsalta parvula* Say, from North America. In his Rhynchotal Notes, XXXV, Annals and Magazine of Natural History, series 7, 1905, Mr. Distant considers *Melampsalta* a "congested genus."

In *Melampsalta* the median and cubitus veins coalesce near the base of the fore wing, whereas in the other genera of Cicadas in America north of Mexico, these veins reach the basal cell or arculus separately. Normally in *calliope* (*parvula*) there are six apical areas

in each hind wing, but there are occasional specimens with but five. Sometimes one wing has five and the other six. In the writer's collection two female *calliope* from Louisiana have five apical areas in each hind wing, and a male from Alabama has five apical areas in the left hind wing and six in the right. A male from Clarke Co., Mississippi, has five apical areas in each hind wing. This specimen is figured on the plate. In *Entomologica Americana*, Vol. IV, p. 82, 1888, Uhler states: "Several specimens of *M. parvula* [*calliope*] have been examined by myself, in which six apical areoles were present in one wing and five in the opposite one."

While in *kansa* the median and cubitus veins unite near the base of the fore wing, thus placing it in the Division *Melampsaltaria* Distant, the fact that it has but five apical areas in the hind wing would seem to consign it to the genus *Pauropsalta* Goding and Froggatt. In the original description of the genus the head is said to be as "wide or a little broader than front of pronotum." It is narrower than front of pronotum in *kansa*, and the illustration of the venation and shape of the fore wing of *leurensis* Goding and Froggatt, the type of the genus, from Australia and Tasmania, show other differences. So it has been thought best for the present to leave *kansa* in the genus *Melampsalta*.

As the genus *Melampsalta* is not a congested one in North America, it will do for the present to also include *camerona* therein, though there is the same objection as in *kansa*, namely the small number of apical areas in the hind wing. However, this character has here been shown to be variable to some extent in the same species.

KEY TO THE SPECIES OF MELAMPSALTA.

(Mentioned in this paper.)

Hind wings with 6 apical areas; rarely there are specimens with but five.

Females straw colored, occasionally with dark marks on the head and thorax. Males usually smaller and with dark marks. Females expand about 37 mm.; males about 35 mm.*calliope* (Walker).

Both sexes green, immaculate, or nearly so.

calliope var. *floridensis* new variety.

Hind wings with 4 or 5 apical areas.

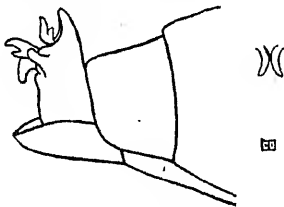
Hind wings with 5 apical areas; body slim, of the same width across the region of the tympanal openings as immediately above and below. Both sexes immaculate green and of the same size; expands about 32 mm.

kansa Davis.

Hind wings with 4 or 5 apical areas; body broader across the region of the tympanal openings than above or below. Both sexes greenish, with dark marks on the head and thorax; and of the same size; expands about 25 mm.camerona new species.

Melampsalta calliope (Walker). Plate V, figs. 14-15.

In 1825 Thomas Say described the only species of *Melampsalta* known up to within a short time from North America, under the name of *Cicada parvula*. He stated that the body was "dull testaceous" with some indistinct blackish marks on the thorax, and that the insect inhabited Missouri. He gave the length as seven-tenths of an inch [17.5 mm.], adding that it is a very small species, and that he has "a specimen from near the Rocky Mountains, which is entirely green, it is a female, and probably of the same species with the above. Its length, to the tip of the hemelytra, is four-fifths of an inch," that is, 20 millimeters. The first mentioned specimen was evi-



MELAMPSALTA CALLIOPE

dently a male, judging from size and color, though the sex is not mentioned by the author.

In the Canadian Entomologist, Vol. 41, p. 390, 1909, G. W. Kirkaldy states that the name *Cicada parvula* was preoccupied, and gives *calliope* Walker as the name of the species. It appears that in 1798 Fabricius described in *Supplementum Entomologiae Systematicae*, p. 521, a "*Cicada parvula*" from Cayenne, South America.

In 1830 E. F. Germar described *Cicada pallescens* in Thon, *Entomologisches Archiv*, ii, p. 8, from Georgia, America. It is said to be small, half the size of *C. hamatoda*. Head pale, front impressed. Collar pale testaceous, with the border all green. Mesothorax pale, variegated with green. Abdomen pale at base, green at apex. Body testaceous beneath, legs variegated with green. Wings entirely hyaline, costa and veins green, the wavy vein parallel to hind margin sometimes black.

This name was also preoccupied according to Mr. Van Duzee's

Catalogue of the Hemiptera of America North of Mexico (1917), for in 1776 Otto Frederick Muller described in his *Zoologiæ Donicæ* Prodrömus, p. 102, a *Cicada pallescens* from Denmark.

In 1850 Francis Walker described *Cicada calliope* in List of the Specimens of Homopterous Insects in the Collection of the British Museum, Part I, p. 212, and gave the locality as "Warm Springs, N. Carolina." Mr. Franklin Sherman, of Raleigh, N. C., does not know of any Warm Springs in North Carolina, nor is the name in the postal guide. It may be that the present Hot Springs in Madison County was the locality.¹ Walker gives among other characters, body pale ferruginous; head as broad as the "fore-chest"; face slightly convex, not at all prominent, adorned with a tawny stripe; crown pitchy; eyes not prominent; "scutcheon [pronotum] adorned with two parallel pitchy stripes, its sides and the furrows also pitchy; hind-scutcheon [hind margin of pronotum or collar] rather narrow above, much broader and rounded at the base of each fore-wing, convex on the middle of each side; scutcheon of the middle-chest [mesonotum] adorned with three broad black stripes; the side pair slightly obconical and oblique; hind border hardly excavated; abdomen obconical, very little longer than the chest, paler beneath, adorned with three rows of pitchy spots, which are much longer and more distinct on each side than in the middle; hind borders of the segments pale tawny." The "wings colorless; fore border ferruginous; veins ferruginous, black towards the tips; fore membranes tawny; flaps tinged with brown at the tips, buff at the base and along the middle vein. Length of the body 6 lines [13.5 millimeters], of the wings 17 lines," [expanse of wings 38 millimeters].

As this name was not preoccupied it has been used by Mr. Van Duzee in his catalogue for the small species covered by the description, extending from the Atlantic through the southern states north-westward to Nebraska and Colorado.

¹ Since the above was written Mr. Nathan Banks has called my attention to Edward Doubleday's "Communication on the Natural History of North America," Entomological Magazine, October, 1838, where, under the heading "Warm Springs, North Carolina, July 8, 1838," he says: "From Asheville I walked most of the way to this place; for in this mountainous country the stage scarcely makes four miles an hour. The road runs mostly by the side of the French Broad river, between high and wooded mountains."

Madison Co., N. C., is therefore the type locality for *calliope*.

In 1888 P. R. Uhler in his "Preliminary Survey of the Cicadæa of the United States," Entomologica Americana, IV, p. 22, states that "This neat little insect is of a pale green color when alive, sometimes marked with fuscous, but speedily becomes straw yellow after desiccation and exposure to the air. It inhabits the plateau-lands of Georgia, Tennessee, Louisiana, Arkansas, Illinois, Kansas and Texas; but it has not thus far been reported from the costal plain of any of the States in which it has been found."

In 1892 Uhler in his "Preliminary Survey of the Cicadidæ of the United States, Antilles and Mexico," Trans. Maryland Academy of Science, I, p. 165, says further regarding the species: "Common in various parts of the United States, and quite variable in color and pattern of marking. When fresh, the ground color is pale green, with the marking of the head, thorax and tergum brownish black; but when dried and kept for some time in the cabinet it becomes pale or dark straw-yellow. Specimens from Florida are much narrower than those from Illinois, Kansas and Nebraska. A male from Texas is faded straw yellow, with a little black on the vertex and about the antennæ. The males are sometimes much smaller than the females."

It will be noted from the foregoing that Say thought that his *parvula* might occur either "dull testaceous" or green, and Uhler considered *parvula* "quite variable in color," and that the fresh green specimens changed in the cabinet to a "pale or dark straw yellow." The series of specimens now in the writer's collection shows that *calliope* in the southeastern United States is marked in the males as described by Walker, and that the females which are usually larger are often lighter colored and without the dark marks on the body. Specimens examined from Florida and parts of Georgia are green, and the same difference in size usually exhibits between the males and females. Specimens from Nebraska, Kansas and Iowa are usually lighter colored than more eastern examples, and while the males have dark marks on the body, the females, which are usually larger than the males, are generally straw yellow; some, however, show faintly the dark marks on the dorsum, particularly on the mesonotum.

Specimens of *Melampsalta*, supposed to be *calliope* as described by Walker, have been examined as follows:

Virginia.—Opposite Plummer's Island in the Potomac River, Au-

gust 9, 1915, female (H. S. Barber). This specimen was found while looking for insects at night with a lantern.

North Carolina.—From Southern Pines and collected by the Rev. A. H. Manee, two males and two females (no date), the females are as small as the males and marked like them; female, July 7, 1911, small and marked like male; male, July 7, 1914; male, July 8, 1914; two males, July 9, 1914; sixteen males, July 12, 1915, and all marked as is usual in males. Mr. Manee writes that he finds many of these cicadas on young pines. Wilmington, August 1, 1911, female (George P. Engelhardt), collection Museum of the Brooklyn Institute of Arts and Sciences. Two females collected at the same place and time as the last by Mr. C. L. Pollard, are in this collection of the Staten Island Institute of Arts and Sciences.

Georgia.—De Witt, Mitchell Co., male (C. S. Spooner); has the dark markings usual, in males. Spring Creek, Decatur Co., July, 1912, four males, three females (J. Chester Bradley), collection Cornell University. In the Uhler collection, U. S. Nat. Museum, there are a male and two females labeled "Ga." All are about the same size and straw colored; the male with black marks on the pronotum. Albany, Dougherty Co., August 1, 1913, female (Rehn and Hebard), collection Acad. Natural Sciences of Philadelphia.

Alabama.—Mobile, five males and five females (H. P. Loding). Grand Bay, Mobile Co., May, 1915, male and female; May 20, 1915, male and female; May 22, 1915, male, all collected by H. P. Loding. Irvington, July 5, 1915, male. Mt. Vernon, May 13, 1917, two males (H. P. Loding). Spring Hill (no date), female; same locality, Aug. 1, 1917, male (T. Van Aller).

Mississippi.—Through the kindness of Prof. R. W. Harned, I have been able to examine thirty-one specimens of this species collected in Mississippi by the students of the State Agricultural and Mechanical College. The localities range from near the northern part of the state to the Gulf coast, and the dates of capture from May 14, 1915, at Fontainebleau, to August 5, 1916, at Hattiesburg. The localities are:—Verona, Houka, Egypt, Stonewall, Laurel, Columbia, Hattiesburg, Lucedale, Anner, Caesar, Nugent, Kiln, Long Beach, Ocean Springs, Fontainebleau and Pascagoula.

It may be remembered that Uhler reported this species only from

"plateau lands," but the last six localities mentioned are in the low lying Gulf strip of Mississippi, which rises a few feet above the level of the sea.

Louisiana.—Alexandria, August 22, 1915, female (Rehn and Hebard); two females labeled "La." One of these females is plain straw colored with a greenish collar, while the other two have dark marks on pronotum and mesonotum.

Indian Territory.—Hughes, June 20, 1907, in cotton field, male (F. C. Bishopp), collection U. S. Nat. Museum.

Missouri.—Hartville, Wright Co., June 20, 1873, female, collection Museum Brooklyn Institute of Arts and Sciences.

Illinois.—In the Uhler collection, U. S. Nat. Museum, there are two males, one labeled "N. Ill.," and the other "Ogle Co., Ill." They are marked with dark spots.

Iowa.—Iowa City, June 24, 1898, female (Wickham). This is a straw colored individual. In the Uhler collection, U. S. Nat. Museum, there are three males and one female from Denison. The males have the usual dark marks, while the female is straw colored. In the same collection there is a female from Dallas Co. that has blackish marks on the thorax, but is lighter than the males.

Kansas.—Wakefield, Clay Co., male and three females; Sheridan Co., 2,650 ft., male (F. X. Williams); Barton Co., 1,816 ft., June 22, 1912, male (F. X. Williams); Ellsworth Co., July, male (Warren Knaus); Grove Co., 2,813 ft., male (F. X. Williams); Topeka, July 11, male and female (E. G. Smyth); Clark Co., June, 1,962 ft., male (F. H. Snow); Chautauqua Co., 841 ft., two males, two females (R. H. Beamer); Miami Co., 1915, male (R. H. Beamer); Ness Co., July 5, 1912, 2,260 ft., female (F. X. Williams); Douglas Co., 900 ft., two females (F. H. Snow); Riley Co., July 13, two females (Popenoe).

In the above series the males are marked with black, while the females are larger and almost wholly straw colored. A few females have indistinct darker marks, particularly on the mesonotum.

Nebraska.—Lincoln, June 25, 1908, 1,450 ft., two males, one female (R. W. Dawson); South Bend, June 25, 1915, female, and July 14, 1915, male (E. M. Partridge); Omaha, June 22, 1918, female (R. R. Leussler).

In the Uhler collection, U. S. Nat. Museum, there is a female

labeled "Nebraska," which has blackish marks on the head and thorax, a dorsal row of dark spots on abdomen, also a row of dark spots on each side of the abdomen. Wings are rather narrow. It expands 39 millimeters.

In the collection of the University of Nebraska are the following:—Rulo, Richardson Co., July 1, 1915, female (E. M. Partridge). Crete, Saline Co., July 6, 1893, female. Lincoln, Lancaster Co., June 24, female; July, male; July 4, 1893, male; June 25, 1908, 1,150 ft., nine males and two females (R. W. Dawson); June 25, 1908, female (C. H. Gable); July 18, 1908, male, and July 23, 1908, male and female (J. T. Zimmer); July 15, 1909, 1,150 ft., female (F. A. Burnham); June 20, 1911, male (L. M. Gates); June 26, 1914, male (G. W. Deming). South Bend, Cass Co., June 24, 1915, female; June 25, 1915, female; June 30, 1915, male, and July 14, 1915, male (all collected by E. G. Anderson). West Point, Cumিং Co., three males; June, female; June, 1887, male; July, 1888, male and female. Maskell, Dixon Co., July 16, 1915, male and female (E. G. Anderson). Carns, Keyapaha Co., July 9, 1902, male; July 11, 1902, female; July 25, 1902, female (W. D. Pierce). In this series the fifteen females are all larger than the twenty-four males, and are of a uniform yellowish straw color. The males are marked in every instance on the head, pronotum, mesonotum and abdomen with dark spots.

Colorado.—In the U. S. National Museum there is a male and female labeled "Granada, Col." This locality is in Prowers Co., in the eastern part of the state and not far from the Kansas state line.

Melampsalta calliope var. *floridensis* new variety. Plate V, fig. 16.

Type male, Ft. Meade, Florida, July 30, 1915 (Mrs. F. E. Porter).

Allotype female, Rye, Florida, July 9, 1919 (Joseph Lienhart). Both in Davis collection.

In the writer's collection there are sixteen specimens from peninsula Florida of what is considered a green and geographic variety of *calliope*. This variety extends to southern Georgia, and perhaps beyond along the coast, where it joins the darker, typical form, in which the males especially are marked with black, or nearly black spots on the head and thorax. The Florida examples in addition to being grass green are immaculate or nearly so. In the many examples examined of the straw yellow or dark typical form, we have seen none from Florida, though it should be found in the northern and especially in the northwestern part of the state. The fact that there is a

grass green *Melampsalta*, though of quite a distinct species, in Texas, Indian Territory, Kansas and Colorado has confused the matter. Prof. Uhler considered the Florida insect narrower than the western one, but the considerable series examined does not confirm this. The Florida form, however, does differ from the dark specimens from Southern Pines in the Sand Hill region of North Carolina in having shorter and broader wings in proportion to the size of the body.

MEASUREMENTS IN MILLIMETERS.

| | Male Type. | Female Allotype. |
|---------------------------------|------------|------------------|
| Length of body | 13 | 13 |
| Width of head across eyes | 4 | 4 |
| Expanse of fore wings | 33 | 32 |

In addition to the type and allotype the following green examples have been examined:

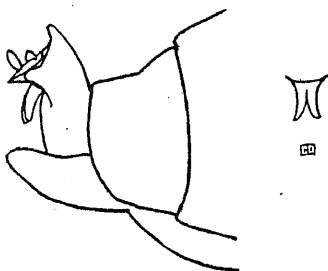
Florida.—Rye, Manatee Co., May 12, 1919, female; May 15, 1919, male; May 28, 1919, male and female; June 10, 1919, male; July 9, 1919, female (all collected by Joseph Lienhart). Gulfport, June, 1915, male, and 1915, female (A. G. Reynolds). St. Petersburg, August, 1915, male and two females (Ludwig). Lakeland, May 5, 1912, female, and May 8, 1912, two females in open woods on low vegetation (W. T. Davis). Jacksonville, July 1, 1913, collection H. L. Johnson. Live Oak, August 10, 1903, male, collection A. P. Morse. Cleveland, April, male (C. P. Benedict), collection Staten Island Inst. of Arts and Sciences. The following are in the collection Acad. Nat. Sciences of Philadelphia:—Enterprise, April 20, female; Jacksonville, August 25, 1911, female (Rehn and Hebard). Both of these specimens are green with indistinct dark marks.

In his Observations on some Hemiptera taken in Florida in the spring of 1908, Bulletin Buffalo Society Natural History, IX, p. 184, 1909, Mr. Edw. P. Van Duzee states: "One tiny male was beaten from a small tree of a broad-leaved oak at Tampa. This specimen made a surprisingly loud noise for so small an insect. It is pale green, almost immaculate and measures scarcely 12 mm. to the tip of the closed elytra."

Georgia.—Spring Creek, Decatur Co., June, 1911, male (J. Chester Bradley), collection Cornell University. Four typical male *calliope* and three females were also taken in July, 1912, at Spring Creek by Prof. Bradley, as previously noted. Spring Creek, July, 1912, female *floridensis* (C. S. Spooner), Spooner collection.

Melampsalta kansa Davis. Plate V, fig. 17.

This small green species was described in the Journal N. Y. Entomological Society, Vol. 27, p. 340, December, 1919, from Kansas and Texas examples. Say's "entirely green" specimen "from near the Rocky Mountains," probably belonged to this species. It may be separated from *calliope* Walker (*parvula* Say), by its smaller head, uncus of different shape, as shown in the illustration, and by having five apical areas in the hind wing instead of six. In the female of



MELAMPSALTA KANSA

calliope the abdomen terminates above in a conspicuous spine; in *kansa* the spine is very small.

Since the description of *kansa* was published, additional specimens have been examined as follows:

Texas.—Sabinal, Uvalde Co., June 13, 1910, male (F. C. Pratt). Dallas, May 19, 1911, female (E. S. Tucker). Grand Prairie, June 19, 1905, male (C. R. Jones). Delhart, June 16, 1910, male (F. C. Bishopp). These are in the collection of the U. S. National Museum.

Indian Territory.—Ardmore, Chickasaws Co., June 1, 1905, female on *Rudbeckia* (C. R. Jones), collection U. S. Nat. Museum.

Oklahoma.—Carnegie, Caddo Co., male, collection of Warren Knaus.

Colorado.—Lamar, about 3,600 ft., June 4-11, 1919, three males (Dr. F. E. Lutz). Regnier, Baca Co., about 4,500 ft., June 6-9, 1919, two males (Dr. F. E. Lutz). These five specimens are in the American Museum of Natural History. They have but five apical cells in each hind wing as mentioned in the description.

Melampsalta camerna new species. Plate V, figs. 18, 19.

Type male, Brownsville, Cameron Co., Texas, "7-6" (E. A. Schwarz). Collection U. S. National Museum.

Allotype female, Brownsville, Cameron Co., Texas, June, 1903 (Charles Schaeffer). Collection, Museum Brooklyn Inst. of Arts and Sciences.

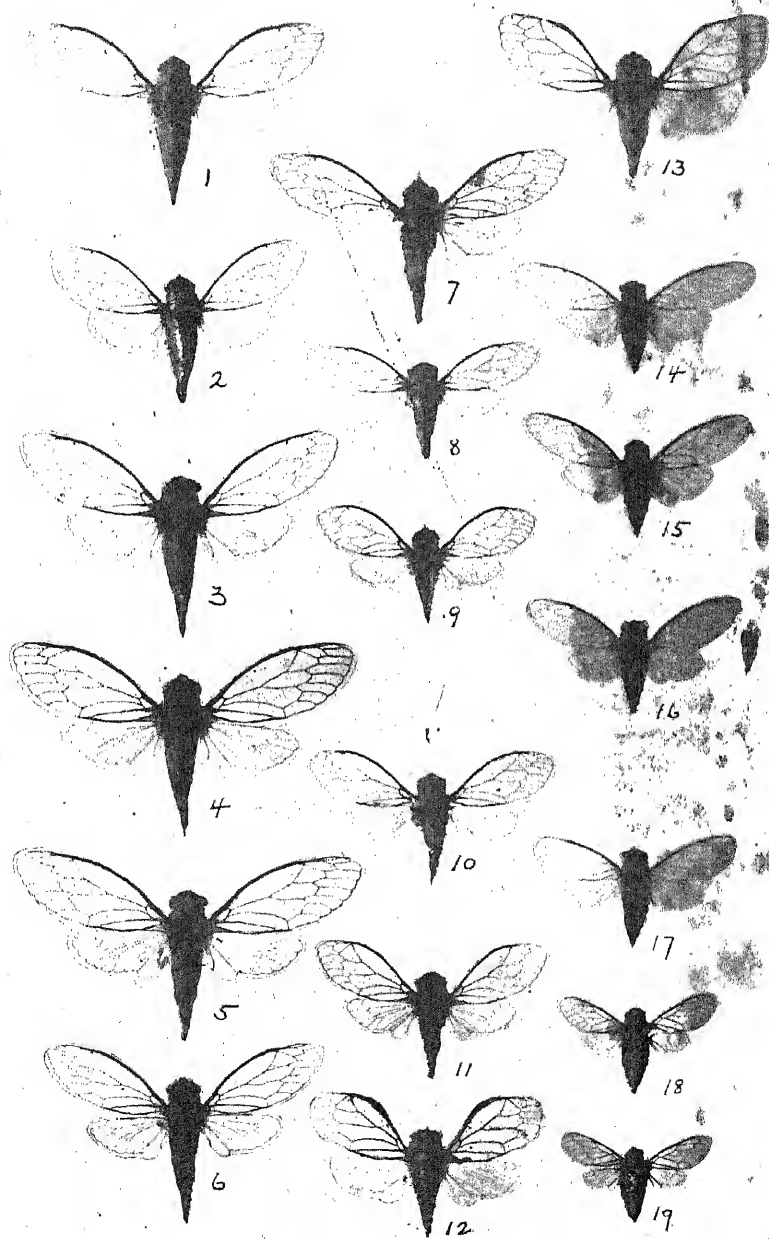
Head small, about as wide as the sinuate, anterior margin of the pronotum; sides of the pronotum not parallel, but considerably widened toward the posterior angles, which are rounded and lobiform. Cavity in which the antenna starts oblique, with the margin high and definite, except anteriorly. Median sulcus of the face well defined. Inner margin of eyes more rounded than in either *calliope* or *kansa*. Fore wings with eight apical areas in type, but with only seven in allotype, and the single paratype. Hind wings with five apical areas in type, but only four in allotype and the paratype. Tympanal orifice rather widely open; more so than in *calliope* or *kansa*. Uncus seen in profile



MELAMPSALTA CAMERNA

curved inward, claw-like; seen from behind deeply cleft. Beneath, the opercula rounded at the extremities, but the ends not touching; about as far apart as in *kansa*, and nearer together than in *calliope*. Last ventral segment broad at base with the sides rather suddenly converging to the rounded extremity. In the allotype the notch in the last ventral segment is broad and deep. While there are some short silvery hairs on the body, this is rather a smooth species.

General color of upper surface of body is green; head variegated with dark brown; a dark dot each side not quite in front of the posterior ocelli. Pronotum green; grooves with scattered brown marks; hind margin or collar entirely green. Mesonotum with four obconical dark marks, the inner pair about half as long as the outer pair. The outer pair broken up into separate blotches, especially near the greenish colored elevated X. Hind margin of the metanotum green. Both pairs of wings clear; basal membranes almost white. Tergum green, the exposed tymbals darker. Beneath the head is variegated with brown, the median sulcus is yellowish, and the transverse rugæ are brown. The legs are pale variegated with brown; the opercula are green; the abdomen yellowish green with the usual dark spots centrally near the base. The allotype is nearly entirely green above, the head slightly variegated with brown along the front, and the dots nearly in front of the hind



ocelli are conspicuous. Beneath it is greenish except the transverse rugæ, tip of the rostrum, some variegated marks on the legs, and ovipositor, which are brownish.

MEASUREMENTS IN MILLIMETERS.

| | Male Type. | Female Allotype. |
|---------------------------------|------------|------------------|
| Length of body | 13 | 12.5 |
| Width of head across eyes | 3.5 | 3.5 |
| Expanse of fore wings | 25.5 | 25.5 |

A single paratype of this species from the collection of the U. S. National Museum has been examined. It is a male and labeled Brownsville, Texas (C. H. T. Townsend).

EXPLANATION OF PLATE V.

- Fig. 1. *Platypedia mohavensis* Davis. Type.
 Fig. 2. *Platypedia rufipes* Davis. Type.
 Fig. 3. *Platypedia putnami*. (Uhler).
 Fig. 4. *Platypedia putnami* var. *lutea* Davis. Type.
 Fig. 5. *Platypedia areolata* (Uhler).
 Fig. 6. *Platypedia similis* Davis. Type.
 Fig. 7. *Platypedia falcata* Davis. Type.
 Fig. 8. *Platypedia aperta* Van Duzee. Holotype.
 Fig. 9. *Platypedia vanduseei* Davis. Type.
 Fig. 10. *Platypedia minor* Uhler. Type?
 Fig. 11. *Platypedia barbata* Davis. Type.
 Fig. 12. *Neoplatypedia ampliata* (Van Duzee). Holotype.
 Fig. 13. *Neoplatypedia constricta* Davis. Type.
 Fig. 14. *Melampsalta calliope* (Walker). Six apical cells in hind wing.
 Fig. 15. *Melampsalta calliope* (Walker). Five apical cells in hind wing.
 Fig. 16. *Melampsalta calliope* var. *floridensis* Davis. Type.
 Fig. 17. *Melampsalta kansa* Davis. Type.
 Fig. 18. *Melampsalta cameroni* Davis. Type.
 Fig. 19. *Melampsalta cameroni* Davis. Allotype. Differs from type in number of apical cells in both pairs of wings.

THE GROUP TRACHES IN NORTH AMERICA.

PART I.

THE GENERA PACHYSCHELUS AND TAPHROCERUS.

BY ALAN S. NICOLAY AND HARRY B. WEISS,

NEW BRUNSWICK, N. J.

Of all the buprestid genera in North America, not any are in more confusion at the present time than *Pachyschelus*, *Brachys* and *Taphrocerus*, which taken together comprise the group *Traches*. This name was used by Kerremans to cover those species having the median coxæ more distant than the anterior ones, the anterior margins of the posterior coxæ slightly concave or slightly dilated at the sides and the tarsi very short. In this group he placed seventeen genera only three of which are included in our fauna. Le Conte and Horn referred to these forms as *Braches* but *Traches* has priority. The members of the genus *Rhaboscelis* possess confluent eyes and have larval habits somewhat similar to those of the *Braches* but in structure strongly resemble the tribe *Agriles*. Here they were placed by Kerremans following the genus *Agrilus* and for the present we think it is best to keep them in this latter group.

Were we to follow the correct sequence in taking up these genera, *Pachyschelus* would come first, followed by *Brachys* and *Taphrocerus*. Unfortunately, however, this paper must be divided into two parts and as the *Brachys* will require at least another year's study, we are taking the liberty of reversing the arrangement to the extent of presenting the genera *Pachyschelus* and *Taphrocerus* together with a general introduction in this part. Part II¹ will deal exclusively with the genus *Brachys*.

In the "Genera Insectorum," Kerremans lists some 147 species of *Pachyschelus*, 89 of which were known to him. All but a very few species which are confined to the Malay Archipelago and one in Madagascar, occur on the American continent, but the great majority

¹ Part II on the genus *Brachys* will appear at a later date.

are tropical. The *Brachys* are confined entirely to the Americas and Kerremans lists 94 species, 46 of which he knew. The genus *Taphrocerus* is restricted to the New World, 38 species being listed, 18 of these being known to Kerremans.

In the following treatment the original description is included after each species, but where this is very brief or vague it is followed by a more complete account.

KEY TO THE GENERA.

1. Scutellum large, triangular, tibiae dilated.....*Pachyschelus*
 Scutellum small, tibiae linear²
2. Body ovate, prosternum obtuse behind*Brachys*
 Body elongate, prosternum pointed behind*Taphrocerus*

Pachyschelus Solier, 33-313.

Metonius Say, 36-264.

Broad, triangular in form; scutellum large, triangular, smooth; thorax widest at base tapering toward head; eyes convex, moderately prominent; head large with a faint to distinct longitudinal impression along the median line; antennae short, 11-jointed; elytra punctate with a large marginal depression posterior to the humerus and a fainter one between the scutellum and humerus; legs retractile, tibiae dilated usually sulcate for the reception of the tarsi which are short; prosternum broad, almost truncate behind; ventral surface impunctate; ventral thoracic surface grooved near margin for reception of antennae; pubescence short and sparse. Our species are black with an aeneous lustre or bluish.

Very little appears to be known concerning the biology of the genera *Pachyschelus* and *Taphrocerus*. Burke in 1917 stated that so far as known no larvae of *Taphrocerus* had been collected and summarized the distribution and habits of members of the *Pachyschelus* as follows: "Eastern States, leaf miner in leaves, *Hicoria*?, *Quercus*?, and *Lespedeza*." According to the same author, the larva of *Pachyschelus* can be characterized as follows: "First segment narrower than following, body tapering both ways from about the middle, more acute at the posterior end, spindle-shaped. Head comparatively small more or less retracted into the first segment of a body composed of 13 fairly well defined, flattened segments; antennae medium sized and

3-jointed; ocelli wanting; labrum rather large, arched and protruded; mandibles short, strong, usually toothed and rather spoon-shaped; maxillæ well developed; maxillary palpi two-jointed; labium well developed, arched, protruded; labial palpi minute and unsegmented, almost obsolete; first segment with a large well-developed plate on both ventral and dorsal surfaces; true legs wanting; cerci wanting; spiracles crescentic, one large one on either side of the second segment and one small one on either side of each of the fourth to eleventh segments, on the anterior dorso-lateral surface."

KEY TO THE SPECIES OF PACHYSCHELUS.

1. Elytra with a subtransverse or diagonal line of whitish pubescence just before the apices, last ventral segment of male with three small teeth (rarely trace of fourth) on each of two prominent processes.....*purpureus* Say.
Elytra glabrous, last ventral segment of male with four small teeth on each of two prominent processes2
2. Elytra black with æneous lustre*lævigatus* Say.
Elytra blue3
3. Head and thorax blue to bluish black.....*schwarzi* Kerremans.
Head and thorax æneousvar. *oculatus* Schaeffer.

Pachyschelus purpureus (Say), 36-164.

americanus Gory, 41-346.

(Original description.)

"Ovate, black, elytra purple. Inhabits Indiana. Body black; head with distinct punctures; front with an indented abbreviated line placed low down; thorax with scattered discoidal punctures; no lateral indentation; elytra purple; indented at the middle of the base and behind the humerus; punctures rather large but not deeply impressed, placed in series and obsolete behind, tibiæ angulated. Length under three-twentieth of an inch.

"This insect is certainly cogenetic with the preceding but it cannot be placed in the *Trachys* or even in *Aphanisticus* if *pusillus* Olivier can be considered as a type of it."

It is rather remarkable that Say did not mention the subtransverse or diagonal line of whitish pubescence just before the apices of the elytra, the faint spot of white pubescence slightly above the centre near the suture which often runs into a line nor the surface being sparsely clothed with white hairs which are shorter and not as close together as those forming the spots or lines. The ventral surface is

impunctate, sparsely clothed with short, white hairs, which are arranged in transverse lines on the abdominal segments. The sexes may be readily separated by the last ventral segment which on the male bears an oblong impression at apex, apical margin produced in the middle into two prominent processes each of which terminates in three small teeth (very rarely with a trace of a fourth). The last ventral segment of the female is not impressed, the apical margin being produced in an acute point. Length, 2.5 mm. to 3.5 mm.

Localities.—Van Cortlandt Park (Pearsall); Queens, L. I., Nov. 28, one specimen sifting leaves (Schott); Staten Island; NEW YORK. Caldwell, Sept. 20, feeding on hickory (Nicolay); Ramsey, May 30 (Nicolay); Ft. Lee, June 9 (Shoemaker); Greenwood Lake, May 17 (Leng); Orange Mts., June 4 (Bischoff); Hemlock Falls, May 28 (Wenzel); NEW JERSEY. ILLINOIS. IOWA. Cypress Mills, April 2; TEXAS. Lake, Marshall and Stark Counties, June 11, July 14, rare (Blatchley); INDIANA. Larva mines leaves of *Lespedeza* (Smith).. Borer of hickory (?) (Felt). Larva in leaves of bush clover, *Lespedeza* and adults beaten from vegetation in marshy places (Blatchley).

This species is taken around New York City by sweeping marshy places during the spring. It occurs locally and is never common. The larvæ live in the leaves of bush clover. Mr. Schott took one specimen while sifting leaves in November and the authors have found adults feeding during September. From this it appears that the adults hibernate. All of the specimens are remarkably constant in size (3.5 mm.) with the exception of two specimens (male and female) before us from Texas, which measure only 2.5 mm. Superficially they appear to be at least a geographical variety but after studying them closely no definite characters could be found. In view of this and until more material is available, we think that they had better be placed with *purpureus*. The dwarfed size may have been due to under nourishment of the larvæ.

Pachyschelus lævigatus (Say), 36-164.

ovatus || (Say), 25-252.

punctatus (Gory), 41-347.

carbonatus (LeConte), 59-252.

politus Kerremans, 96-322.

(Original description.)

"Ovate, black; head without indented line; elytra without regular punctures. Desc. Body very short, ovate, black; head without the usual dilated indentation but a very slight indentation may be observed on close inspection, particularly on the lower part of the front; slightly punctured; thorax equal with the exception of a dilated indentation on each side with distant punctures in which is a raised centre; scutellum large, flat, impunctured, polished; elytra with wide, irregular not deeply impressed punctures, without any appearance of a regular series, no appearance of elevated lines, a profound excavation behind the humerus without any sinus of the edge, humerus prominent. Length rather more than one-tenth of an inch. This is the smallest species I have met with and of a shorter form.

"Afterwards (Trans. Amer. Phil. Soc. vol. 6, p. 164) made the type of a new genus *Metonius* which is identical with *Pachyschelus*. *T. ovatus* Weber is a very different insect belonging to *Brachys*,—Lec.

"*M. ovatus* nob. (*Trachys*) Ann. Lyc. N. Y. Those who will retain this species in *Trachys* must change the name of *laevigatus* as the other is preoccupied in the genus."

The pubescence of the ventral surface is less pronounced than that of the preceding species. The sexual characters are similar to those of *purpureus* except that in the males, the process on the last ventral segment bears four instead of three small teeth. Length, 2-3 mm.

This species is very common in most localities and ranges from S. E. Canada to Florida and west to Iowa. Late May to August 11. Blatchley records it on the foliage of black gum and flowers of black haw, milkweed, etc. According to Chambers it mines *Desmodium*. This species was redescribed many times. Called *ovatus* by Say in his original description (1825) the name was preoccupied in the genus *Trachys*. Afterward (1836) discovering his error, the name *laevigatus* was proposed and although since put in another genus, to comply with the laws of nomenclature the latter name must be retained. Le Conte's *carbonatus* is merely a phase of this species, but just why one having such a universal knowledge of the family as Kerremans should redescribe it under the name *politus* is hard to understand.

Pachyschelus schwarzi Kerremans, 92-298.

caeruleus || Schwarz, 78-364.

(Original description.)

"Short ovate, black, head and thorax bluish black or black with æneous tinge, scutellum and elytra bright blue, shining. Head deeply channeled, alu-

taceous, obsoletely punctulate. Thorax without lateral depression and with sparse, shallow punctures almost obliterated on the disc, more obvious at the sides, finely alutaceous at the sides. Elytra with a deep impression on the sides before the middle and with another obsolete one near the suture behind the middle, plainly punctured with traces of regular rows on the disc. Length 2-3 mm. .08-.12 inch. Male, last ventral segment with an oblong impression at apex, apical margins produced in the middle into two prominent processes each of which terminates in four small teeth. Female, last ventral segment not impressed, apical margin produced in the middle in an acute point.

"Very abundant everywhere in Florida. In form and size this species resembles *P. laevigatus*, the elytra however are less triangular and more rounded at the sides: it differs also by its color and by the thorax not being impressed at the sides. Very probably there will also be a difference in the sexual characters of the males but we have not seen the male of *P. laevigatus*. In *P. purpureus* the last ventral segment of the male has a similar impression but the two processes are more separated from each other and each terminates in three teeth."

In this species the ventral pubescence is almost obsolete except on last abdominal segment. Easily separated from preceding species by bluish color of entire dorsal surface. Length, 2-3 mm.

Localities.—ARKANSAS (Nicolay collection). Enterprise, April 18; Tampa; Key West (Nicolay collection); Sanford, April 24 to May 9, Crescent City (Van Duzee); Dunedin, March 16 (Blatchley); FLORIDA. Billy's Island, Okefenokee Swamp, June (Leng); GEORGIA. Harrisburg, July 31 (Wenzel); TEXAS.

This is a strictly southern form and evidently not rare where it occurs. The name *caruleus* was given to a species from Guiana by Gory in 1841. The spelling of this name with an "o" instead of an "a" by Kerremans is incorrect.

Pachyschelus schwarzi var. *oculatus* Schaeffer, 09-377.

(Original description.)

"Black, head and thorax æneous, elytra blue. Head distinctly longitudinally impressed along the median line; finely and densely punctate with some coarser punctures intermixed; eyes rather convex. Thorax at apex feebly emarginate; sides obliquely narrowing to apex, almost straight to about apical fourth, then slightly arcuate; base bisinuate, median lobe almost truncate; surface finely and very densely punctate especially at sides, intermixed with

longer, ocellate punctures which are more feeble on the disc; laterally on each side sharply impressed. Scutellum large, triangular, smooth. Elytra coarsely punctate; interval between the punctures more or less wrinkled; basal and lateral impressions deep; apical subsutural impression less deep. Sculpture of underside of body rather finely reticulate, intermixed on the pro- and metasternum with large ocellate punctures; metasternum at sides plicate; abdomen very sparsely pubescent. Length 3 mm. Nogales, Arizona.

"This species is very close to *caruleus* but is more slender and has the eyes more convex than any other of our species."

This is merely a geographical variation distinguished by the æneous lustre of the head and thorax. The remarks by Mr. Schaeffer about it being more slender with eyes more convex are misleading. In the large series of *schwarzi* before us, there are many specimens which are certainly more slender than this variety. Also the eyes are not more convex but the median line is more deeply impressed, which might give them that appearance. In certain specimens of *schwarzi*, however, the impression of the median line is even deeper than in the variety, so this character has no value.

Localities.—Nogales, ARIZONA (Schaeffer). ARIZONA (Nicolay collection).

There are only two specimens of this variety known to us. The type collected by Mr. Schaeffer is in the collection of the Brooklyn Museum and a single female with only the state label is in the Nicolay collection. There is no variation in the two specimens.

Taphrocerus Solier, 33-314.

Body elongate; scutellum small, smooth, triangular; thorax usually widest at base, rarely with sides parallel (*laevicollis* Le Conte); head large with a median longitudinal impression; eyes large, oval; antennæ short, eleven jointed; elytra punctate, sides sinuate, a faint depression between scutellum and humerus; legs less retractile than in preceding genus, tibiæ linear; tarsi short; prosternum pointed behind; ventral surface of thorax grooved near margin for the reception of antennæ; pubescence short and sparse. The dorsal surface of our species are entirely black to coppery in color. In the "Biologia," Waterhouse uses a key to separate the forms giving as the first division, species with or without a lateral carina on the elytra. In studying our species, we find that all are without it.

' KEY TO THE SPECIES OF TAPHROCERUS.

- | | |
|---|-------------------------------|
| 1. Elytra glabrous | 2 |
| Elytra with spots or lines of pubescence; pubescence rarely wanting and replaced by punctate foveæ | 5 |
| 2. Thorax widest at and depressed at base | 3 |
| Thorax not depressed at base, uniformly rounded, sides parallel or widest at centre | 4 |
| 3. Robust, black with a slight virescent to æneous shine; tips of elytra strongly serrulate; length 4.5-5.5 mm. | <i>puncticollis</i> Schwarz. |
| Depressed, æneous; head shining, deeply impressed; tips of elytra not or very feebly serrulate; elytra coarsely punctate; length 3.5-4 mm. | |
| | <i>schaefferi</i> nov. sp. |
| 4. Subparallel, coppery, moderately shining; thorax widest at middle; head alutaceous, feebly impressed, narrower than widest portion of thorax; elytra finely punctate | <i>agriloides</i> Crotch. |
| Sides of thorax parallel; head as wide as thorax. | <i>laevicollis</i> Le Conte. |
| 5. Apical half of elytra with two white fascia; black with æneous rarely virescent lustre to entirely æneous. | <i>gracilis</i> Say. |
| Apical half of elytra with six isolated dots of white pubescence; black without æneous lustre | <i>albonotatus</i> Blatchley. |

Taphrocerus puncticollis Schwarz, 78-363, Plate VI (Fig. A).

(Original description.)

"Elongate above, blackish blue or black with faint æneous tinge, shining. Head less strongly excavate, very finely alutaceous, distinctly moderately, sparsely punctate, punctures deeper than in *T. gracilis*: Thorax transverse, narrowed in front when viewed from above, sides minute before the hind angles which are rectangular, base strongly lobed in the middle, lobe broadly emarginate, surface uneven with the distinct carina in front of the hind angles very finely alutaceous, coarsely unequally punctured, each puncture bearing a very short scale-like hair. Scutellum transverse, shining. Elytra impressed at base, impressions on the disc not obvious, serrate at outer apical angle, anteriorly moderately strongly striate punctate, punctures obsolete toward the apex, each with a very fine short hair, interstice on the disc unequal, the striae therefore appear subgeminata, humeral carina broadly interrupted at middle. Beneath bluish black or black, metasternum coarsely punctured, abdomen with sparse shallow punctures, last segment with a deep semicircular marginal sulcus. Length 5 mm. .20 inch.

“Enterprise and Cedar Keys. More elongate than *gracilis* and distinguished by the deeper punctuation of head, thorax and metasternum and by the elytra less even without patches of pubescence;

from *T. agriloides* it differs chiefly by the form of the thorax which in the latter species is not narrowed in front when viewed from above."

Localities.—Biscayne, May 23 (Schwarz) (Leng and Schaeffer collections), Paradise Key (Royal Palm Hammock), February (Wetmore), FLORIDA. Delchamps, August 30; Coden, June 9 (Loding); ALABAMA.

This is the largest of our species and according to the few specimens known seems to be constant in size and punctuation. Mr. Edward Chapin informs us that Mr. Wetmore has taken some forty specimens of this rather rare species, all from the same locality.

Taphrocerus schaefferi nov. sp., Plate VI (Fig. B).

Depressed, æneous; elytra punctate striate, punctures coarse, each one with a short, white reflexed hair, tips usually not serrulate, rarely very feebly so. Umbone prominent, base of elytra with fovea, sides sinuate, widest at base where it is sharply emarginate, thence broadening to center, becoming gradually narrower toward apex. Thorax widest at base, distinctly, transversely depressed at base and apex, a distinct carina just inside the basal angle; rather sparsely and unevenly and finely punctate, each puncture with a reflexed hair. Head shining, sparsely punctate, front with a deep longitudinal impression attaining or nearly attaining occiput. First and second antennal joints large and globular, next three narrow elongate, last six wider, strongly serrate. Ventral surface æneous, legs black with æneous lustre, finely and distinctly punctate, pubescence white, arranged in usual transverse rows on the abdomen. Length, 3.5 mm. to 4 mm. Width, 1 mm.

Localities.—Brownsville, August 26, TEXAS. Type in Nicolay collection. One paratype in the collection of Mr. Howard Notman and two in the collection of Mr. Charles Schaeffer.

This species appears to be allied to *puncticollis* but is at once distinguished by the much smaller size, more flattened form and æneous color. To Mr. Gilbert Arrow of the British Museum we are much indebted for comparing this as well as our other species from the south and southwest with the specimens in the collection of that institution so as to avoid any possibility of error. The species is named in honor of Mr. Charles Schaeffer of the Brooklyn Museum to whom we are greatly indebted for many favors.

Taphrocerus agriloides Crotch, 73-75, Plate VI (Fig. C).

(Original description.)

"Subelongate, æneous, head very sparingly punctate, with an impressed line on the front; thorax alutaceous, transverse, sides straight, coarsely and sparsely punctate, base with a rounded median lobe; elytra deeply punctate striate, the punctures decreasing towards the apex. L. 14, Texas (Belfrage).

"In appearance very like *Agrilis putillus*."

Superficially this species is very close to *schaefferi* and undoubtedly mixed with it in many collections as it occurs in the same locality but has a more extended range, specimens having been taken as far north as Georgia. It will be necessary to add the following to the above description in order to clearly define this species. Coppery, moderately shining, elongate, elytra gradually narrowing from about the apical half, more finely punctate than *schaefferi*, tips distinctly serrulate, umbone not noticeable, fovea at base of elytra smaller and less distinct. Thorax widest at middle evenly rounded when viewed from above; a more or less distinct fovea on each side near base. Front of head much more feebly impressed, alutaceous. Ventral surface æneous, finely and moderately punctate, pubescence sparse, arranged in transverse rows of short, white hairs on the abdomen. We can not see that this species resembles *Agrilis putillus* in any very striking point. Length, 3.5 mm. Width, 0.75-1 mm.

Localities.—Codan, June 9; Mobile, April 11; Delchamps, August 30, on rushes in salt marsh (Loding); ALABAMA. GEORGIA. TEXAS.

This species is at once separated from *schaefferi* by the thorax being widest at centre, not impressed at base and without carinæ inside the basal angle. The head is alutaceous, more feebly impressed. Elytral punctuation is finer with the tips strongly serrulate and the body is more elongate and parallel.

Taphrocerus lævicollis Le Conte, 78-403, Plate VI (Fig. D).

(Original description.)

"Very small, slender, convex, narrower behind, black-bronzed, shining. Head and prothorax nearly smooth, the former large, longitudinally impressed; the latter with very deep oblique impressions towards the sides, which are nearly straight and subparallel. Elytra uneven with vague rows of feebly impressed striæ. Length 2.5 mm.; .10 inch.

"Enterprise (Florida): one specimen. Easily recognized by the small size, large head, not narrower than the prothorax and by the latter not being narrowed in front."

Head and pronotum shining with short, white pubescence. Elytra sinuate, smooth, feebly punctate striate. Ventral surface with short sparse hairs; abdominal vestiture arranged in transverse lines.

Localities.—Haw Creek, April 6 (Schwarz), FLORIDA. Coden, June 9 (Loding), ALABAMA.

This species is quite distinct and readily recognized from the original description. It appears to be local and by no means plentiful, being represented in only a very few collections.

Taphrocerus gracilis (Say), 25-252, Plate VI (Fig. E).

alboguttatus (Mannerheim), 37-120.

cylindricollis Kerremans, 96-312.

(?) *texanus* Kerremans, 96-312.

(Original description.)

"Oblong blackish; elytra with regular series of punctures. Body rather slender, oblong, blackish-brassy; head a little concave, but not profoundly so; thorax inequal, with a slight impressed line before, and a wide indented space occupying half the thorax behind; on each side is a raised, arcuated, obtuse line, extending nearly from one angle to the other; scutel moderate; elytra with regular series of rather large, profoundly impressed punctures which are obsolete at tip. Length, less than three-twentieths of an inch.

"A comparatively slender species. I found it on a myrtle bush at Senipuxten Island, in September. It exhibits an unusual regularity in its series of punctures." (This is the type of *Taphrocerus* Sol.; the name under which it was known to him is the synonym *Brachys alboguttata* Lap. and Gory.-Lec.)

On fresh and unrubbed specimens there are two distinct fascia of white pubescence on the apical half of the elytra and occasionally a spot on either side at the base, but, in most cabinet specimens, there is but one band, often reduced to a mere spot. The variation in the sculpture of the elytra seems unlimited. The commonest form is punctate striate, the punctures being rather unevenly arranged, coarse at the base becoming obsolete after the first fascia. However, some specimens are almost smooth while others, chiefly those from the

southwest, have the striæ evenly, finely and densely punctate. Moreover specimens are often met with which have a deep, longitudinal sulcus on each elytron. There is a deep depression at the base and usually a distinct fovea just before the apex. Thorax widest and deeply depressed at base. Head and thorax rather smooth, sparsely hairy. Ventral surface black. Metasternum strongly punctate. Abdomen finely punctate, slightly to densely hairy, hairs not arranged however in transverse rows. Length, 2.6-4.5 mm.

Ranges from Canada to Florida and westward as far as Iowa, Texas and Arizona. Around New York City specimens have been found from May 17 to September 8. Found beating in swampy places (Smith, Ins. N. J., p. 295). On flowers and leaves of button bush, *Cephalanthus occidentalis* and on herbs in low wet places (Blatchley, Col. Ind., p. 805).

Few species possess such a great individual variation as this one and it is remarkable that more names have not been erected. The forms from Arizona, New Mexico and Colorado upon superficial examination appeared so distinct in having well defined, finely punctate striæ and smooth elytra with æneous lustre that we at first considered them as a valid species and distinct from the more unevenly sculptured blackish insects taken in the east. However after examining over one hundred individuals, we could discover no real specific difference and upon receiving several from Brownsville, Texas, possessing the uneven shape, coarsely punctured striæ of the eastern form, yet retaining the brilliant æneous color of the western insects, we felt that it would be best to regard it as one variable species as Kerremans and our other predecessors did, rather than name the extreme forms, which are not geographically limited and if consistently followed out would mean the erection of at least six new species.

The Leng collection contains a very peculiar individual from Florida, which has the elytra broadly and deeply sulcated, the sulci running parallel to and half way between the suture and sides until just before the apex, where they converge toward the suture, each ending in a deep fovea. A specimen from Anglesea, N. J., collected by us has the entire surface marked with irregular pits and cavities. From Georgia, are specimens almost smooth and impunctate with a virescent shine. Mr. Schaeffer took one at Pine Island, N. Y., which

has the evenly and finely punctured striae of the typical specimens from the southwest. Therefore we prefer to consider these all as aberrant forms of *gracilis*. In a very few individual cases there are no traces of the fascia but these we regard as having been rubbed off naturally or as a result of handling. Punctate foveae replace the pubescence in these examples.

From the description it would appear as if Kerremans had before him one of these extreme forms when he erected the name *texanus* and as the type is not obtainable, we believe that it is best placed as a synonym of *gracilis*. However at the end of the text, there will be found a translation of his original description, for those not satisfied with this admittedly rather uncertain placing of his species.

Gracilis is our most abundant and widely distributed species. It is common around New York City and taken while sweeping meadows usually in moist places where the vegetation is rank.

Taphrocerus albonotatus Blatchley, 19-29, Plate VI (Fig. F).

(Original description.)

"Elongate, slender, strongly tapering behind. Black, shining, very sparsely and finely pubescent; the elytra with eight isolated white pubescent spots, arranged in three cross rows, two each in the first and third, and four in the second or middle row; the spots of the third row crescent-shaped, the others rounded or oblong, the first row at middle, the others equally spaced behind it. Head as broad as front of thorax, finely alutaceous, not punctate, the occiput with a wide, shallow, median impression. Thorax twice as wide as long, base slightly wider than apex, disk uneven, but less so than in *gracilis*; surface minutely alutaceous and with large, shallow, scattered ocellate punctures. Elytra at base slightly narrower than base of thorax, sides broadly sinuate in front of middle, straight and strongly converging from apical third to the obtusely rounded tips; disk with regular rows of large shallow punctures, these becoming obsolete towards apex. Abdomen with large very shallow punctures, each enclosing a small oblong white scale. Length, 3.5-4.5 mm."

Localities.—Jacksonville (Leng collection), Lakeland, Ft. Myers, La Belle, Dunedin, October 20 to April 10 (Blatchley), FLORIDA; Billy's Island, Okefenokee Swamp, June (Leng), GEORGIA.

This is a southern species taken by Mr. Blatchley on huckleberry and other low shrubs in late fall and early spring. The pubescence is rather an uncertain character to depend upon unless the specimens

are fresh and not rubbed, but the lack of bronze and more slender and more tapering body should make it easy to separate from *gracilis*, which also occurs in Florida.

Taphrocerus texanus Kerremans, 96-312.

(Translation of original description.)

Elongate, subparallel, cylindrical, attenuated before and behind, entirely black, very lightly bronzed.

Head punctate, convex, slightly grooved on anterior part of front. Pronotum almost square, slightly narrower in front than behind, slightly convex, covered by an irregularly spaced punctuation like that of the head; the anterior margin straight, the sides nearly straight, obliquely truncate anteriorly, the posterior angle straight, the base weakly bisinuate with the median lobe projecting and sharp. Shield very small. Elytra wider than pronotum at base, rugose and covered with a series of longitudinal dots, scarcely sinuate on the sides, as high as the posterior hips, very slightly widened toward the middle, attenuated afterward following a slightly pronounced arc as far as the summit which is separately rounded and finely toothed. Ventral surface very finely granulated. Length, 3.5 mm. Width, 0.8 mm. Texas.

Mr. Gilbert Arrow of the British Museum writes: "We have only the single type specimen of *T. texanus* so that it is not possible to send it, but it seems to me to be different from both *T. gracilis* and *T. agriloides*. It is like the former in size and shape but has conspicuous punctures thinly scattered over the pronotum. It is an old specimen from which the original labels have been removed so that of course there is a possibility that the locality may be incorrect."

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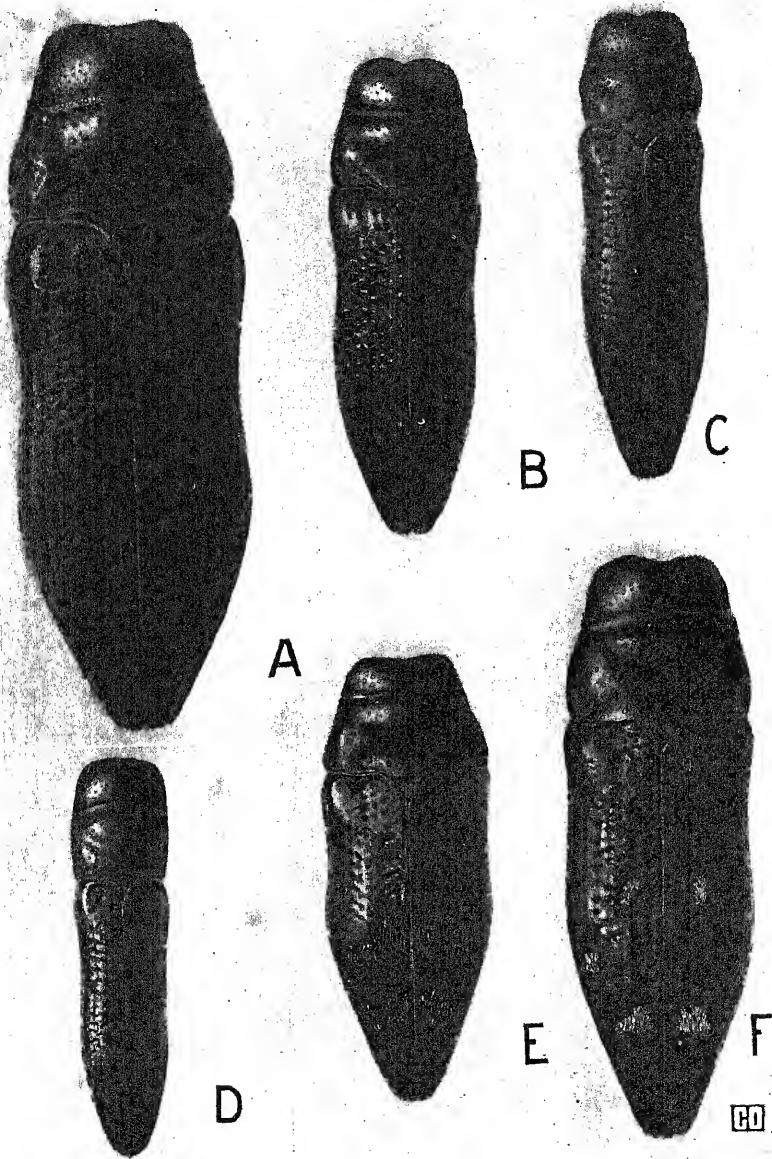
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ACKNOWLEDGMENTS

We are especially grateful to Mr. C. W. Leng and Mr. Chas. Schaeffer for placing their collections at our disposal and for references to the literature and helpful criticism. For records, specimens and other help, we take pleasure in extending our sincere thanks to Mr. C. A. Frost, Mr. H. P. Loding, Mr. W. S. Blatchley, Mr. Howard Notman and Mr. Gilbert Arrow.

EXPLANATION OF PLATE VI.

- Fig. A. *T. puncticollis*.
 Fig. B. *T. schaefferi* n. sp.
 Fig. C. *T. agriloides*.
 Fig. D. *T. levicollis*.
 Fig. E. *T. gracilis*.
 Fig. F. *T. albonotatus*.
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(TAPHROCERUS.)

NOTES ON TWO LITTLE-KNOWN WOOD-BORING
BEETLES. CHRYSOBOTHRIS SYLVANIA FALL
AND MELASIS RUFIPENNIS HORN.
(BUPRESTIDÆ, ELATERIDÆ.)

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Chrysobothris sylvania Fall.

This buprestid was described by Prof. H. C. Fall (1)¹ as follows: Original Description:

"*C. sylvania* new species. Closely allied to *trinervia*, but rather broader and heavier, the color beneath bright green in the male, dark green with cupreous reflections in the female; prothorax as abruptly or even more abruptly narrowed behind than in front; elytral costæ not as distinctly elevated as in typical *trinervia*, the smooth spaces sharply defined, the punctured areas more densely punctate than in *trinervia*; sexual characters as in *trinervia*. Length 11.5-11.8 mm.; width 5-5.1 mm."

The type material consisted of four specimens, two of each sex, taken by Mr. Ricksecker at Sylvania, Calif.

The next reference to this species is in Dr. Woodworth's "Guide to California Insects" (2) where he merely lists *C. sylvania* as occurring in California.

In 1916 Dr. E. C. Van Dyke (3) mentions that the type material was taken in Sonoma Co., and that Mr. Nunenmacher had taken a specimen in Del Norte Co., also that specimens had been taken in Oregon by Mr. J. C. Bridwell and myself. In 1917 (4) I summarized the foregoing information and added some Oregon localities to the distribution and gave Douglas fir as a host tree.

Aside from the brief notes mentioned there has been nothing concerning this species published.

Adult. Length 12 mm.; width 5 mm.

Antennæ green, lobes of joints 4 to 11 purplish, joints 1 to 3 more slender than 4, joints 4 to 11 gradually narrowing, third joint as long as the next two. Upper front brassy green, lower portion brilliant green, densely, coarsely punctate with two smooth callosities. Clypeus broadly emarginate, acute at

¹ Numbers refer to the bibliography.

sides. Thorax twice as wide as long, sides subparallel at middle, narrowing rapidly one-fourth from apex and base, median sulcus deep at middle, densely and deeply punctured, obliterated by elevated smoother spaces at either end, broad, irregular, broken, elevated; smooth places each side of median depression. Elevated spaces irregular, black and smooth, punctured areas brassy green, more brilliant green along lateral margins. Base of elytra distinctly wider than thorax, sides parallel for slightly more than one-half their length, then narrowing sharply and serrate. Apices rounded; first costa nearly entire, prominent and smooth; others obliterated; basal foveæ deep; remainder of elytral surface composed of about equal areas of elevated, smooth, dark areas and depressed, densely punctured, dark green areas; under parts of male uniformly bright metallic green.

FEMALE: Bluish-purple beneath, prosternum more smooth and shining; anterior tibia arcuate, not suddenly dilated at tip.

MALE: Prosternum densely hairy; anterior tibia arcuate and suddenly dilated at tip.

Pupa. The pupa (Plate VII, fig. 1) is of the common *Chrysobothris* type; white or yellowish-white in color, head bent sharply forward, resting on the breast with the legs and wing pads folded on the ventral surface. Length, 10 to 12 mm.; width, 5 to 5.5 mm.

Larva. The larva (Plate VII, fig. 2) is whitish, and of the typical flathead type, sparsely covered with fine bristle-like hairs. The ventral plate is oval, roughened and marked by a long inverted V, formed by two deep grooves, the apex of the V touches the anterior margin of the plate while the open end stops about one-sixth from the posterior margin. The ventral plate is of the same oval shape but slightly smaller than the dorsal, the median groove does not reach either margin. The fourth segment is shorter and narrower than the fifth. The last segment is decidedly constricted. Length, 24-27 mm. Width of first thoracic segment, 4.5-5.5 mm.

Egg. The egg is oval, semitransparent, flattened on the side which comes in contact with the bark; average measurements are about 1 by .6 mm. The eggs are deposited singly, in crevices or under the edge of bark scales. Observations indicate that eggs may be deposited in clusters or near to one another, as seven young larvæ were found under one piece of bark, roughly 6 by 8 inches, and three full grown larvæ making pupal cells in an area three inches square.

SEASONAL HISTORY.

The eggs are deposited in crevices of the bark in late April and May, in the vicinity of Corvallis;² the minute larvæ enter the bark, work to the cambium and extend their mines through the cambium, bark or wood during the summer, fall and winter. Pupation takes place in March or April and lasts from two to three weeks. The first adults were noted April 16.

WORK AND HABITS.

The habits of the larvæ differ, some work only a short time in the cambium, excavating their characteristic oval tunnels which are about three-fourths in the bark and one-fourth in the wood; they then enter the sapwood and often work into the heart wood; others seem to spend almost their entire larval stage in the cambium. Just prior to pupation the larva digs to the outer portion of the bark, leaving a thin covering over the future exit hole. From here the larva invariably returns to the sapwood to pupate. From one-fourth to one-half an inch below the cambium will be found the pupal cell, which measures from 7 to 10 mm. in width and 12 to 15 mm. long, always parallel to the surface and with the grain of the wood. The mines are packed with borings and excrement but lack the concentric appearance of the packings in the mines of many of the group.

PARASITES.

The most important parasite of this beetle seem to be a predacious mite *Pediculoides ventricosus*.³ These mites were found in great numbers on both larvæ and pupæ. The males are hardly visible to the unaided eye, while the females appear as small spherical yellow bodies, which might be taken for eggs; the largest are almost one mm. in diameter. The extent of the ravages of these mites may be judged from the following experiments.

² Elevation 400 ft. Latitude 44° 32'. N. Longitude 123° 16' W.

³ This peculiar species belongs to the small family *TARSONEMIDÆ*. The male and female differ radically. The female when mature has the abdomen enormously swollen so that it is 20 to 100 times greater than the rest of the body due to the mass of eggs within. The eggs hatch and the young grow within the body of the parent and are born sexually mature. The male has almost no abdomen, the body is short and angulate behind. Both sexes possess needle-like mandibles and sucking mouth parts.

A piece of wood containing larvæ of *C. sylvania* was collected in March and put in a breeding cage. On April 7, the wood was opened to get larvæ for study and the first specimen encountered was dead, shriveled and covered with mites. Upon further examination 12 larvæ and 4 pupæ were found, all dead and literally covered with mites. Another specimen of wood collected in the same locality at about the same time contained fourteen larvæ, ten of which were either dead or in a dying condition due to the mites. Two were unfested and emerged April 22 and April 24 as male beetles; of the remaining two, one died from no apparent cause and the other was parasitized by an ichneumon fly. Three undetermined species of Ichneumonidæ were found to be parasitic upon the beetles. The largest species was found to be quite common in certain infested logs. Breeding experiments indicate that about 20 per cent. of the beetles are destroyed by these ichneumon flies.

Melasis rufipennis Horn.

Of this species I am able to find no reference in our literature other than the original description by Dr. Horn⁴ followed by the statement that it occurs in Nevada and Washington Territory.

There are two species of this genus found in our fauna *M. pectinicornis* Mels. being the eastern representative and *M. rufipennis* Horn, the western. Both species seem to be quite rare.

Original description:

"*M. rufipennis* n. sp.—Form elongate, subcylindrical, slightly narrowed behind, piceous, subopaque; pubescence fulvous, scarcely visible, elytra and antennæ rufo-ferruginous; antennæ attaining the middle of the thorax, the third joint nearly twice as long as the visible (in front) portion of the second, joint four triangular, broader than long, five to ten gradually more prolonged anteriorly, but less so than in *pectinicornis*: eyes small, round, feebly convex; head densely and rather coarsely punctate, not rough, clypeus slightly concave, front sometimes with a slight transverse carina; thorax a little wider than long, slightly narrower behind, sides straight, slightly arcuate at the apical angles and with a feeble sinuation in front of the hind angles, which are acute and slightly divergent; disc moderately convex, densely punctured and roughly granulate, with a narrow median smooth line very distinctly impressed posteriorly; elytra gradually narrowed posteriorly, the apices, acute, disc deeply striate with coarse punctures, the intervals convex, densely punctured, but more shining than above: legs piceous, tibiæ and tarsi brown. Length .36-.42 inch; 9-19.5 mm."

⁴ Trans. Amer. Ent. Soc., Vol. XIII, p. 7 (1886).

In addition to Horn's description it is well to note that the thorax is decidedly darker than the elytra, usually black. In the male, which is smaller than the female, the antennæ is more pectinate, wider, a little longer. The thorax is decidedly more narrowed posteriorly. The last ventral segment is elevated at the center into two blunt spines, in much the same manner as certain Scolytidæ. These spines are present in both sexes but more highly developed in the male. Dr. Horn gives the length 9-19.5 mm., the latter figure is probably an error. In examining over 100 specimens the smallest was 8.3 mm. and the largest 12.2 mm. long. (Plate VIII, fig. 3.)

Larva. Yellowish white, first segment behind head is flattened and broader than the others, second slightly broader than third, from the third on the segments are the same size with the exception of the anal segment which is decidedly constricted. In segments 5 to 11 the anterior third is constricted; the posterior two-thirds more rounded and larger; length 26 to 29 mm.; width of first thoracic segment 3.5 mm. Mouth parts dark brown or black and well developed. The dorsal and ventral plate of the first thoracic segment is marked by a double "TT," dark reddish brown in color, the cross arms of the T's do not touch; the lateral half of each cross arm is thickened, Plate VIII, fig. 5.

Pupa. The pupa, Plate VIII, fig. 4, is yellowish, slender, 12 mm. long, 3 mm. wide; has the cylindrical appearance of the adult; the head is bent forward on the breast and the appendages are folded on the ventral surface in the same manner as buprestid pupæ.

SEASONAL HISTORY.

Larvæ, pupæ, and fully formed adults were found in April. The first adults observed emerged April 16 and the last pupa were found June 2. What appeared to be full-grown larvæ have been taken in February, April, June, September and November. This would indicate that more than one year is spent in the larval stage.

LIFE HISTORY.

No eggs were observed and although larva, pupa and adults were taken from the same tree for three years and hundreds of beetles emerged, no indications of reinfestation of nearby trees were ob-

served. The hundreds of larvæ seen were practically all the same size, no small specimens being observed. The larvæ do not work in the cambium but go directly into the wood.

The mines, Plate VIII, figs. 1 and 2, are flat, approximately 4 by 1.5 mm. in cross section, very long, winding, often crossing each other. Before pupation the larva excavates almost to the surface then retreats back into the wood, enlarges the mine and pupates. When ready to pupate the larva is always found doubled back on itself with the head and anal end pressed tightly together. The newly formed adult makes its way to the surface along the mine made by the larva. This flat mine is too small to allow the passage of the body of the adult, so it is forced to enlarge it, emerging through a perfectly round tunnel from 3.5 to 4 mm. in diameter.

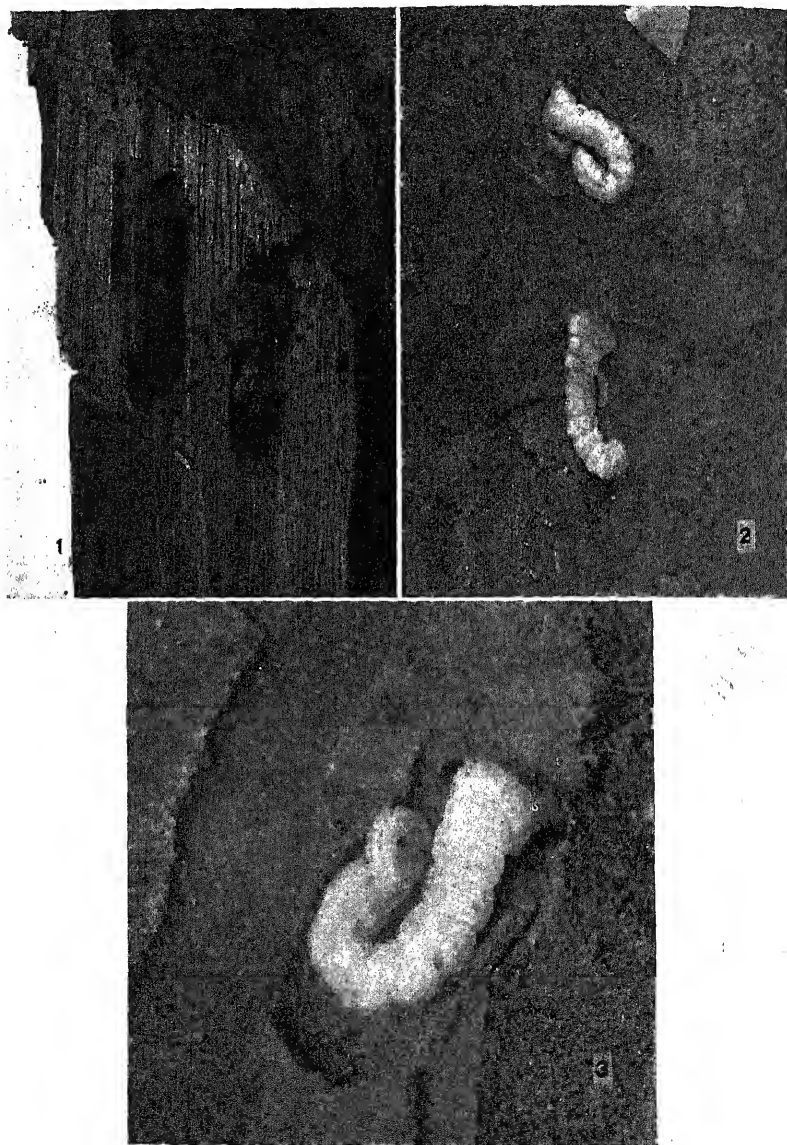
WORK.

The flat mines of the larva literally honey-comb the wood of trees attacked.

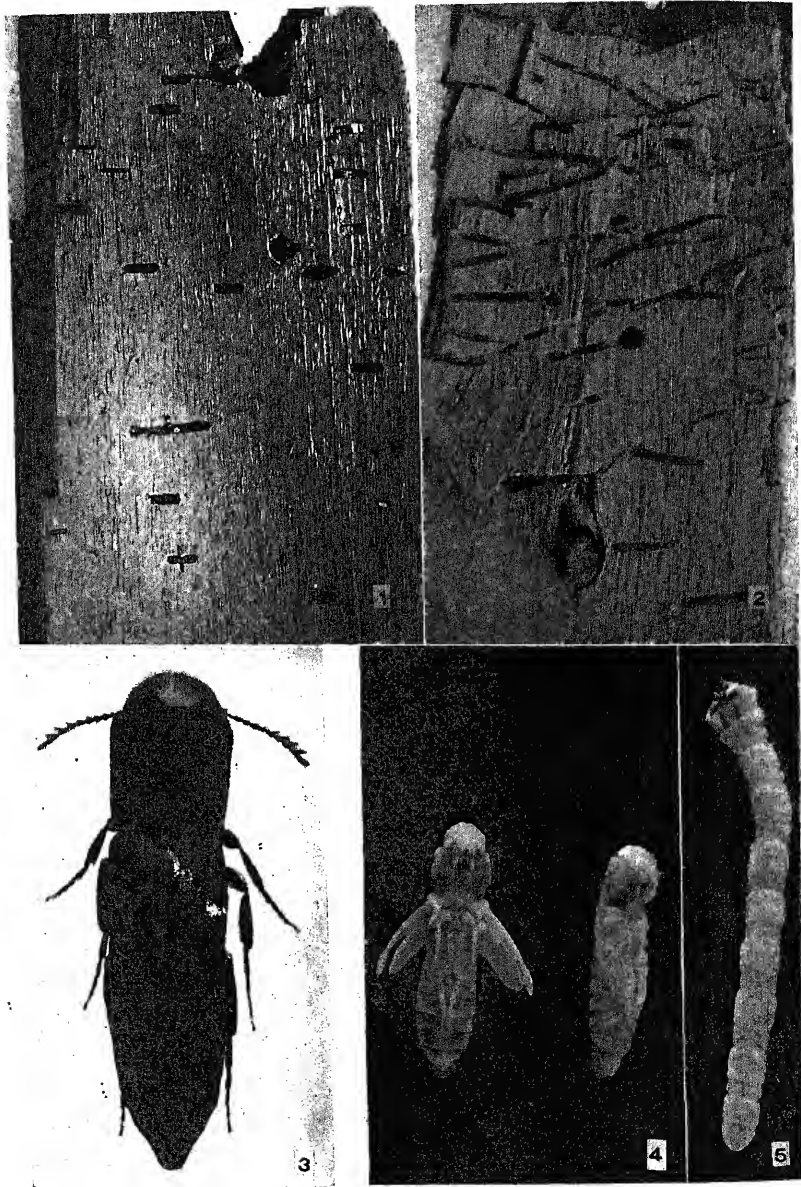
A Grand fir tree, sixteen inches in diameter, was found attacked from the base to a height of eight feet and there was hardly a square inch of the wood which was not penetrated by at least one mine. This tree was living when first noted (1914) and the colony of beetles had been in it for some time as there were numbers of emergence holes present. In 1916 the tree broke off at a point four and one-half feet from the ground; there were still many beetles present in various stages. The tree was still living but so weakened by the larval mines that it was an easy prey to the wind. The only other colony of these beetles observed was in a white fir and the tree had been broken off by the wind in the same manner. A few dead beetles and the characteristic mines gave evidence of the cause.

Distribution: Washington, Oregon and Nevada. In Oregon a few dead specimens were collected on Paddy Creek near Sparta, in the Blue Mountains of Grant County, and a large colony lived for years in a Grand fir tree within a mile of the Oregon Experiment Station at Corvallis.

Hosts: Taken from Grand fir (*Abies grandis*) and white fir (*Abies concolor*).



(CHRYSOBOTHRIS SILVANIA FALL.)



(MELASIS RUFIPENNIS HORN.)

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1. 1910. Fall, Journ. New York Ent. Soc., XVIII, p. 50.
2. 1913. Woodworth, Guide to California Insects, p. 196.
3. 1916. Van Dyke, Ent. News, XXVII, p. 410.
4. 1917. Chamberlin, Ent. News, XXVIII, p. 139.
5. 1886. Horn, Trans. Amer. Ent. Soc., XIII, p. 7.

EXPLANATION OF PLATES.

PLATE VII.

Fig. 1. Adult and pupa of *Chrysobothris sylvania* Fall, in their cells in sapwood of Douglas fir. Natural size.

Fig. 2. Full grown larvæ of *Chrysobothris sylvania*, attacked by larvæ of an ichneumonid. Slightly enlarged.

Fig. 3. Same as fig. 2, greatly enlarged.

PLATE VIII.

Fig. 1. Cross sections of the larval mines of *Melasis rufipennis*, about natural size. Note the adult emergence hole near center.

Fig. 2. Grand fir wood showing longitudinal sections of the mines.

Fig. 3. Adult of *Melasis rufipennis* Horn. (Greatly enlarged.)

Fig. 4. Pupæ of *M. rufipennis* Horn. (Greatly enlarged.)

Fig. 5. Larva of *M. rufipennis* Horn. (Greatly enlarged.)

DESCRIPTION OF ORCHESTINA SALTITANS BANKS. (ARACHNIDA.)

BY ALEXANDER PETRUNKEVITCH, PH.D.

The family Oönopidæ is very poorly represented in the United States. Banks has described in 1893 one species of *Gamasomorpha* from Florida (*G. floridana*), and in 1894 a species of *Orchestina* from New York (*O. saltitans*). In 1909 Emerton described a male from Massachusetts, which he identified as *O. saltitans*. In 1910 I identified a male caught in New Jersey as *O. saltabunda* Simon, a species occurring regularly in Venezuela. Comte de Dalmas has published a revision of the genus *Orchestina* in Annales de la Société Entomologique de France in 1916. He makes the suggestion that the spider described by Emerton is not an *Orchestina*, but a *Tapinesthis*, closely related to *Tapinesthis inermis* Simon, a spider found fre-

quently in France, and possibly representing a new species. In the same paper Comte de Dalmas puts forward the opinion that the spider which I identified as *O. saltabunda* is in reality the male of *O. saltitans*. That this male is not *O. saltabunda* is quite evident from the structure of the palpus which Dalmas figures on page 227 (figures 24 and 25). Whether it is the male of *O. saltitans* of which Banks has described only the female, remains an open question. Since however I omitted to give a description and merely gave two figures, I thought it advisable to give now a detailed description of my specimen and measurements and drawings of the most important parts. To accomplish this I have cut off the legs and palpi, preserved them as microscopical slides, made the drawings with the aid of an Abbe drawing apparatus and the measurements with an ocular micrometer. For the convenience of the reader I reproduce here first the description of the female given by Banks, with the correction as to its size, given by Dalmas (in Banks's description a decimal point is omitted by mistake).

Orchestina saltitans Banks, female. "Length 1.1 mm. Cephalothorax whitish, with a black marginal line and a black spot around eyes; mandibles pale; legs and palpi yellowish; sternum whitish; abdomen purplish above, quite dark near tip, center pale, spinnerets white. Cephalothorax quite broad, yet plainly longer than broad, and broadest a little before the middle; highest behind the middle and sloping to the narrow clypeus; no dorsal groove nor radial furrows; three rows of curved hairs above; eyes large, subequal, all close together. Mandibles quite long, vertical; lip quadrangular, broader than long; sternum triangular, longer than broad, emarginate in front, tapering behind and prolonged between the posterior coxæ. Legs long and slender, fourth pair as long as first, third pair much the shortest, quite thickly clothed with hairs, two prominent claws; posterior femora greatly thickened, fully twice as broad as femur I, and not much over four times as long as broad. Abdomen nearly globose, but a little longer than high, quite thickly clothed with stiff hairs; spinnerets all close together; region of epigynum slightly swollen, a transverse furrow, beneath which is a pale area crossed by a yellow line."

One female from Sea-Cliff, Long Island, New York; taken in the house. When touched by a pencil, leaped backwards three centimeters.

Orchestina saltitans Banks, male. (Plate IX.) *O. saltabunda* Petrunkevitch, 1910, nec *O. saltabunda* Simon, 1892, nec *O. saltitans* Emerson, 1909. Length 1.05 mm. Cephalothorax 0.53 mm. long, 0.44 broad between second

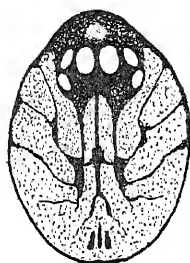
and third pair of legs, very high (figs. 1, 2, 8 and 9). Chelicera slender. Maxillary plates almost parallel, with short scopula at apical quarter. Lip wider than long, its shape difficult to see. Sternum slightly longer than wide, emarginate in front, cordiform, narrowly produced between the hind coxæ (fig. 3) and very convex (fig. 8). In this connection I should like to point out that figure 1 is a reproduction of the original figure which I published in 1910 and represents the spider in a position in which its back is considerably inclined toward the observer. After the legs of both sides have been removed by a cut between the coxæ and trochanteres, fig. 8 was drawn with the aid of the drawing apparatus and represents the exact profile of the cephalothorax. From an examination of this figure it will appear that the carapace is highest between the second and third coxæ and that in front of the first coxæ the carapace is considerably extended downward thus forming a rather high clypeus. It will also be seen that the convexity of the sternum is greatest in the region of the second coxæ. The carapace slopes therefore more gently forward and the sternum backward. The eyegroup surrounded by black pigment (figs. 2, 8, and 9) is composed of six eyes, all nocturnal and grayish in color. The middle eyes which are probably the posterior median eyes are larger than the side eyes. From above they appear as ovals, but viewed from in front they have the shape of a somewhat irregular circle. The clypeus is about two and a half times as high as the diameter of the middle eyes. Abdomen ovoid, higher than long (fig. 1). Anterior spinnerets slightly heavier than posterior ones. Legs slender II-I-IV-III, first coxæ wide apart (fig. 3). Hind femora considerably dilated, being only 3.2 times as long as their width in middle (fig. 6). Measurements of legs in millimeters:

| Leg. | Femur. | Pat. + Tibia. | Metatarsus. | Tarsus. | Total. |
|------|--------|---------------|-------------|---------|--------|
| I | 0.48 | 0.62 | 0.43 | 0.23 | 1.76 |
| II | 0.49 | 0.63 | 0.46 | 0.23 | 1.81 |
| III | 0.37 | 0.40 | 0.32 | 0.17 | 1.26 |
| IV | 0.50 | 0.57 | 0.39 | 0.13 | 1.59 |

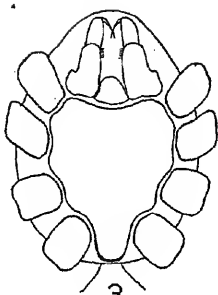
Feet with onychium. Claws two, with powerful curved teeth at base (fig. 7), fine teeth in middle third and smooth at apical third. Palpi heavy, with very large bulb (fig. 5). Tibia much distended. Tarso-metatarsus spoon-shaped, half as long as the width of the bulb. Both figs. 4 and 5 were drawn after the palpi were removed, cleared in oil and preserved as permanent microscopic preparations. The figures are easily understood, as they supplement each other, the one giving a sideview of the entire palpus less its coxa, the other a front view of the bulb and tarso-metatarsus. The embolus is long and thin and is curved outward. Inside the bulb the small sperm receptacle may be seen close to its base, and the long sperm duct forming a loop in its middle. The hair covering the body and appendages is of two types: simple hair of various length attaining greatest dimensions on the abdomen, and minutely plumose hair found only on the legs and palpi.

Coloration. The general appearance of the spider when viewed with naked eye is such as if he had a black abdomen and a yellow cephalothorax and legs. On closer examination under microscope one notices that the coloration of the abdomen is complex. Curved interrupted black lines the only ones shown on fig. 1 so as not to obscure the drawing, are on a general field of purplish spots and dots with small yellow spaces separating them. The spinnerets are light yellow. The legs are yellow including coxæ. Sternum is dark owing to irregular pigmentation. Lip and maxillary plates are lighter than the sternum; yet show pigmentation. Palpi, especially their tibia mottled with black. Bulb yellow. Chelicera yellow with some black pigmentation in front. Cephalothorax yellow with a narrow black margin, very regular black lines and spots as shown in figs. 2 and 9, black area around the eyes, and small black dots and short lines all over the surface.

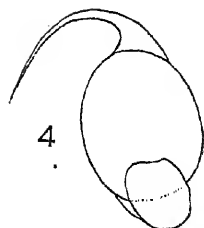
The only specimen in existence was caught by Mrs. Petrunkevitch on June 26, 1907, in our home at Short Hills, New Jersey, where we lived at the time. When I came to study it in 1910, Emerton's paper was already published. Since his specimen which he identified as the male of *Orchestina saltitans* had evidently no resemblance to my specimen, I reluctantly placed my specimen as *O. saltabunda*. Is it after all the male of *O. saltitans*? The description given by Banks of the single female which he collected is not sufficient to clear the matter. There is a certain similarity both in structure and coloration between his female and my male, but also not inconsiderable differences, as may be seen from a comparison of the two descriptions. It were perhaps safer to give my male a new name, but I am not anxious to increase the number of names. It is strange however that all our knowledge of Oönopid spiders in the United States is based on four specimens only. So far as I know, no other specimens have been collected. In the case of *Gamasomorpha* it is very likely that the species really occurs in Florida. But is it sure that the other specimens belong to the fauna of the United States and have not been accidentally imported with fruit or some other goods from the West Indies or Central or South America?



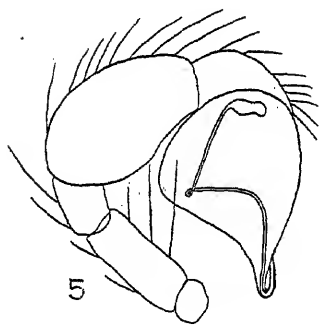
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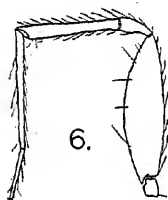
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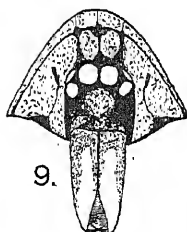
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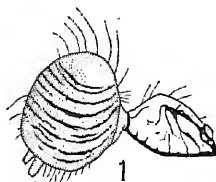
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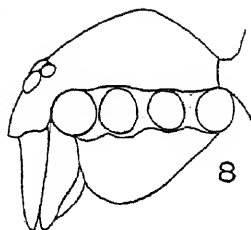
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(ORCHESTINA SALTITANS BANKS.)

SOME NEW RHYNCHOPHORA FROM EASTERN
NORTH AMERICA WITH ADDITIONS TO AND
CORRECTIONS OF THE "RHYNCHOPHORA
OF NORTHEASTERN AMERICA."

By W. S. BLATCHLEY,

INDIANAPOLIS, IND.

Since the "Rhynchophora of Northeastern America," prepared by Chas. W. Leng and myself, was issued in September, 1916, a number of undescribed forms have been collected by me or sent in by others. More extended collecting in southern Florida, especially in the Cape Sable and Lake Okeechobee regions, have furnished additional notes on the distribution and habits of a number of species included in the work. I have therefore prepared this paper, which includes descriptions of new forms from the region covered by us, mention of those described since 1916 by other authors, notes on habits and extension of range, and corrections of a number of errors which were bound to occur in the text of such a work as our "Rhynchophora."

The errors mentioned were, for the most part, made known to me by Col. Wirt Robinson of West Point, N. Y., who, while making extended use of the work in naming and placing his species, made a manuscript list of such errors or suggestions for improvement as were found or occurred to him. This list he kindly forwarded to me.

In the pages which follow the number before each species is that of the species in the Rhynchophora. Where a page is cited in parenthesis it is also that of the Rhynchophora.

I have found in recent years that many species of Rhynchophora occurring in Florida hibernate in the adult stage in dead branches, bunches of dead twigs, leaves or Spanish moss, dead air plants, etc., in or about the edges of hammocks. By beating these various objects above an open umbrella numerous species supposed to be rare have been found to be frequent or even common in numbers. Examples of such species are *Hormops abducens* Lec., *Erodiscus tinamus* Lec. and *Lembodes solitarius* Boh. At Cape Sable in late February more than 40 species of Rhynchophora were thus found hibernating.

As that portion of the "Rhynchophora" devoted to the family Scolytidae was prepared by Mr. Leng, I have not covered it in this paper. A number of additional Scolytids have been taken by me in Florida, but as yet I have not found time for their determination.

6. *Ormiscus saltator* Lec.—This small Anthribid evidently occurs throughout Florida and on the keys. It was beaten from dead branches at Cape Sable and Key West.

11. *Toxotropis floridanus* Leng.—This prettily marked species was described (p. 28) from two specimens taken at Enterprise, Fla. I have since taken a dozen or more by sweeping ferns in a dense wet hammock at Dunedin.

24. *Toxonotus fascicularis* Schön.—I found this a common species at Cape Sable on the dead branches of the saffron plum, *Bumelia angustifolia* Nutt. About Dunedin it hibernates in bunches of Spanish moss.

41. *Euxenus piceus* Lec.—A single specimen of this curious little Anthribid was found crawling on the beach at Cape Sable. The color ranges from dark reddish-brown to deep shining black.

42. *Rhinomacer pilosus* Lec.—It was stated (p. 49) that the members of the subfamily Rhinomacerinae "occur on pine and other coniferous trees." About Dunedin I find this species frequent during the winter months in the seed pods of a low shrubby ericad, *Xolisma fruticosa* Michx.

59. *Rhynchites elusus* Blatch.—This species was taken at Lakeland Feb. 11 by beating Spanish moss. About Dunedin a half dozen or so are taken each season in March by sweeping the flowers of the low myrtle huckleberry, *Vaccinium myrsinites* Lam. It also occurs at light in April.

83. *Apion tenuiforme* Fall.—This species was originally described from specimens in the Schwarz collection from Florida, without more definite locality. A single specimen from Dunedin, Nov. 8, is at hand.

92. *Apion walshii* Smith.—A single specimen is at hand taken in Porter Co., Indiana, May 9. This is the first record from that State.

96. *Apion importunum* Fall.—Specimens, so named for me by Mr. Fall, were taken by sweeping in Skinner's Hammock near Dunedin. It was described from "Georgia and Florida," without more definite locality, though Fall stated that it is probable that his types came from "extreme southeastern Florida and adjacent region."

122. *Tachygonus lecontei* Gyll.—In addition to the localities mentioned (p. 94) this curious little weevil has been taken at Dunedin and Lakeland, Fla., Jan. 9, Feb. 21, so that it passes the winter in that region in the adult stage.

127. *Epicærus formidosus* Boh.—Several specimens have been taken at Dunedin between December 9 and March 15 by sweeping low shrubs in dry, sandy open woods.

140. *Paragræphus setosus* Blatch.—Both genus and species of this handsome Otiorynchid were founded on a unique. Eight specimens have since been taken, all within one hundred yards of the type locality on Hog Island, not more than three on any one day. It occurs in company with four other weevils, *Agræphus bellicus* Say, *Tanymecus lacæna* Herbst., *Baris splendens* Casey and *Chalcodermus inæqualis* Horn, in the axils of the leaves of a yellow flowered thistle *Carduus spinosissimus* Walt. By cutting the thistles off at the ground, then holding them over a rubber blanket and whacking the leaves from the stem with a hatchet or trowel, the weevils will be found "playing possum" in the debris left on the blanket. One hundred thistles will usually yield about 50 Barids, 30 of the *A. bellicus*, ten of the *Tanymecus*, two or three of the *Chalcodermus* and perhaps one of the *Paragræphus*. A hurricane and tidal wave swept the island in September, 1918, and neither thistle nor weevil could be found there the ensuing winter.

151. *Pachnæus opalus* Oliv.—Frequent at Long Key and Key West, Feb. 27 to March 3, on the foliage of a large purple morning-glory and that of various shrubs. Occurs in company with *Artipus floridanus* Horn, the latter being the most common Rhynchophorid found at Key West in early March.

207. *Listronotus floridensis* Blatch.—This species was found in numbers near Moore Haven, Fla., March 2. It occurred on the flowers of an arrow-head, *Sagittaria*, which was growing in the low swales left by the receding of Lake Okeechobee at that point. Fresh specimens were more densely and conspicuously scaly than any of the allied species.

217. *Hyperodes cryptops* Dietz.—This species also occurs in some numbers on the flowers of *Sagittaria* and allied plants about Dunedin and Moore Haven.

Hyperodes poseyensis new species.

Oblong-oval, rather robust. Dark reddish-brown densely clothed with large gray scales, those of beak, occiput and femora with a metallic sheen; sides of thorax with a rather broad stripe of larger gray scales, these also covering the humeri and gradually evanescent on sides of elytra; disk of elytra with scattered vague fuscous blotches formed by larger scales. Beak slender, subcylindrical, distinctly longer than thorax, but feebly tapering, its sculpture concealed by the large metallic gray scales; antennal grooves deep, narrow, sharply defined. Antennæ slender, scape not reaching eye, joints one and two of funicle slender, subequal, club small, oval. Thorax about as wide as long, sides broadly rounded, front margin wider than base, sculpture concealed by the scales, from between which arise numerous slender, pointed inclined black bristles. Elytra at base strongly emarginate, three-fifths wider than thorax, humeri prominent; sides straight and parallel to middle, thence strongly converging to the narrowly rounded apex; disk with sculpture concealed; intervals wide, feebly convex, each with a single row of slender inclined brownish bristles. First and second ventral segments coarsely and densely punctate, 3-5 finely and more sparsely punctate, the fifth without sexual impressions. Length 3.8 mm.

Posey County, Ind., April 27. Two specimens taken from beneath logs. Belongs under *dd* of Group II (p. 168) of the Rhynchophora, but size larger, beak longer, thorax relatively narrower and scales much more metallic in hue than in *montanus*. The bristly hairs of both thorax and elytra are slender, not at all clavate. By Dietz's key it runs to his *Hyperodes* group, which contains only Pacific slope species.

Hyperodes lodingi new species.

Elongate-oblong, slender, subdepressed. Reddish-brown; occiput, tip of beak, middle and sides of thorax and middle of femora darker; elytra with a submarginal stripe and a more or less broken subsutural one blackish. Beak stout, slightly shorter than thorax, subdepressed, feebly bicarinate, densely reticulate-punctate; upper margin of antennal grooves directed toward middle of eyes. Antennæ with first and second funicular joints slender, subequal, scape reaching front margin of eyes; club large, stout, elongate-oval. Thorax subcylindrical, about as broad as long, densely and coarsely cribrately punctate; surface with a row of small, oval, silvery yellowish scales arranged transversely each side of disk and each puncture of middle and sides with a curved hair-like scale; ocular lobes covering one-half the eyes in repose. Elytra at base one-half wider than thorax, about three times as long as wide; sides subparallel to beyond middle, thence converging gradually to a conjointly rounded apex; surface without setæ or pubescence, evenly not densely clothed

with very small oval silvery gray scales; disk with rows of close-set rather coarse punctures, these much wider than the narrow feebly convex intervals. Abdomen rather coarsely and closely punctate, each puncture enclosing a very small gray scale. Length, 3.5-3.8 mm.

Named in honor of H. P. Loding of Mobile, Ala., who kindly gave me four specimens taken near Mobile, August 1. He states (Ms.) that: "They were found after a cloud-burst on grasses and other plants on the site of an old dried-up pond, where they, with many other things, were trying to save themselves from the flood." This species belongs under *aa* of Group III (p. 171) of the Rhynchophora. It differs from the other three species there included in being wholly without setæ. The scales are much smaller than in any of the others and are so arranged that the surface hue is plainly visible. Two of them, smaller than the others, are probably males, though no sexual distinctions are evident.

256. *Hormops abducens* Lec.—A colony of 60 or more specimens of this rare beetle was found in Skinner's Hammock near Dunedin in February, 1918. It was in a large bunch of dead twigs and leaves in a tangle of vines about ten feet above the ground.¹ A single specimen was found about one-half mile distant in the same hammock in 1919. Leng, in the same number of the Journal cited, p. 209, records it also from Waco, Texas.

***Smicronyx halophilus* new species.**

Elongate-oval, convex. Dull red; head, antennæ, suture of elytra and tarsi darker. Sides of thorax densely clothed with large, oval, grayish-white scales; elytra with basal fifth, humeri, and a large oblique patch on median third thickly clothed, and the three outer intervals and apex more thinly clothed, with similar scales; entire under surface thickly clothed with circular, ocellate, white scales. Beak rather stout, of nearly equal size throughout, feebly curved, scarcely as long as thorax, male, as head and thorax, female, thickly reticulate-punctate. Second and third joints of funicle subequal, together scarcely as long as first. Thorax slightly longer than wide, narrowed in front and constricted near apex, sides broadly rounded, disk densely and finely punctate. Elytra oval, conjointly nearly two-thirds wider than base of thorax, humeri prominent; sides parallel to beyond middle, thence gradually curved and convergent to the narrowly rounded apex; striæ narrow, minutely punctate; intervals flat, three times as wide as striæ, minutely rugose, without visible punctures or setæ. Under surface very finely and thickly punctate, the sculpture hidden by scales. Length, 2.3-2.7 mm.

¹ See Journ. N. Y. Ent. Soc., XXVI, 1918, pp. 155-161.

Described from 11 specimens swept from low herbage along the margins of tidal lagoons at Key West, March 1 to 3. The color varies somewhat, some specimens having the disk of thorax, beak and basal half of elytra blackish like the head. The scales are easily abraded, in one or two specimens being almost absent. Belongs under *a* of Group III (p. 216). Differs from *S. congestus*, its nearest ally, in its shorter, relatively stouter beak, its longer, narrower thorax, and especially in the shape and arrangement of its scaly vestiture.

304. *Smicronyx apionides* Casey.—A single specimen of this very distinct and prettily marked species was swept from herbage in a low moist woodland in Knox County, Ind., Oct. 5, 1917. The first record for the State.

Bagous pictus new species.

Elongate-oblong. Reddish-brown, densely clothed with grayish-brown and snow-white scales, the latter forming a narrow median and a broad stripe each side of thorax, the lateral stripes forking in front of middle; the white scales on elytra covering the humeri and fifth, sixth and seventh intervals to beyond the middle; basal portion of third interval and a common spot on second and third at apical third also white. Beak stout, as long as thorax, strongly deflected, densely scaly. Head without frontal fovea. Thorax nearly as broad as long, constricted near apex, densely granulate. Elytra oval, one-third wider than thorax, humeri oblique; intervals feebly convex, without tubercles on or near the declivity. Length, 2.8 mm.

Two specimens taken at Cape Sable, Feb. 24, by sweeping low herbage along the edge of the beach. Allied to *obliquus* Lec., but stouter, without declivity tubercle and with a different and very striking arrangement of the white scales on elytra.

360. *Paragoges minimus* Blatch.—A half dozen specimens of this minute Tychiid, which was described from a unique from Ft. Myers, were taken at Key West, March 3. They were swept from low herbage near the old fort.

361. *Erodiscus tinamus* Lec.—This was a common species at Cape Sable where it occurred on dead branches in the hammocks, especially on those of the saffron plum, or seaside oak, *Bumelia angustifolia* Nutt.

367. *Otidocephalus dichrous* Lec.—This peculiarly colored species has been taken on several occasions in June at porch light near Dunedin; also by beating the foliage of bay in a dense hammock.

Balaninus parvidens Chitt.²—A male of what Dr. F. H. Chittenden pronounces this species was taken at light at Dunedin, Fla., Sept. 20, and sent to me. This form was mentioned (p. 272) but not described. The surface is very evenly clothed with a mixture of grayish and pale brown scales. These are so arranged that no color pattern is evident. The beak is slightly shorter than elytra. Length of body 6.2 mm. Whether it is a variety or synonym of *B. humeralis* Casey can only be told by direct comparison with the type and a better knowledge of the food habits of both.

A female of another species, taken at Dunedin, October 31, Dr. Chittenden states is probably his *B. victoriensis*, described³ from Victoria and other points in Texas.

Dr. Chittenden protests (Ms.) against the placing (p. 267) of his *B. orthorhynchus*⁴ as a synonym of *B. rectus* Say, and has sent me a female of the former bred from *Quercus rubra* for comparison. While the color and general facies of his specimen is the same as in *rectus*, the beak is one-fourth shorter and distinctly less curved in its apical fifth. The femoral tooth is much smaller, more acutely produced, with entering angle rounded, not obtuse and oblique as in *rectus*. These characters indicate specific differences where only a small series is present for examination. Whether they will hold throughout a large series can only be told by future study of the two forms.

414. **Anthonomus scutellaris** Lec.—The southern range of this species was given (p. 288) as "Georgia to Texas." It has since been beaten on several occasions in March from the flowers of a clump of cultivated plum trees near Dunedin, Fla.

415. **Anthonomus elegans** Lec.—This handsome subarctic species was recorded (p. 289) only from the east coast of Florida. A half dozen were taken at Cape Sable from the buttonwood, *Conocarpus erecta* L. Two have also been taken on the same shrub on Hog Island, opposite Dunedin.

421. **Anthonomus costulatus** Suffr.—This is a common species along the coasts and keys of southern Florida on the buttonwood and the mangrove, *Rhizophora mangle* L.

² Proc. Ent. Soc. Wash., X, 1908, 24.

³ Bull. 44, U. S. Div. Ent., 1904, 31.

⁴ Proc. Ent. Soc. Wash., X, 1908, 26.

424. *Anthonomus grandis* Boh.—This destructive species has not yet done much damage in Florida. A specimen from Lake City is at hand. It was not known from that State in 1916.

441. *Anthonomus uniformis* Blatch.—A number of examples of this species have been taken at Dunedin and Lakeland, Fla., in February and March. It occurs only in the vicinity of ponds and lakes on huckleberry and other low shrubs.

446. *Anthonomus unicus* Blatch.—Since 1916 this species has been collected at Lakeland and Okeechobee City, Fla. It hibernates in bunches of Spanish moss and in spring occurs on foliage about the borders of hammocks.

449. *Anthonomus varipes* Duval.—This well marked weevil has been taken in small numbers at both Cape Sable and Key West. It was beaten from foliage of saffron plum and was also found beneath logs on the beach.

***Baris australis* new species.**

Elongate-oblong; moderately slender. Black, strongly shining with a purplish or bronze metallic lustre. Beak two-thirds the length of thorax, stout, feebly curved, very finely and sparsely punctate. Head alutaceous, minutely and very sparsely punctate. Thorax one-fourth wider than long, sides straight for three-fourths their length, then rounded to apex; disk strongly convex, coarsely punctate, the punctures separated by their own diameters, those near apex gradually smaller. Elytra elongate-oval, as wide at base as thorax, sides straight and parallel to apical fifth, thence rounded into apex; striæ fine, deep, impunctate; intervals wide, flat, each with a single row of widely spaced, rather fine punctures, those of the third interval slightly confused. Sterna coarsely and closely, abdomen finely and sparsely, punctate; third and fourth abdominal segments each with only a single post-median cross-row of small punctures. Length, 2.8–3 mm.

Dunedin and Lakeland, Fla.; Billy's Island, Ga.; Feb. 1 to June. Swept from huckleberry and other low shrubs along the margins of ponds. Allied to *B. hyperion* Casey, but smaller, relatively broader, the punctures of thorax coarser, much less numerous. Specimens were submitted to Col. Casey who stated that they were unknown to him.

***Pseudobaris connectans* new species.**

Elongate-oval, robust. Black, shining; femora piceous; antennæ, tibiæ and tarsi reddish-brown. Beak nearly as long as head and thorax together, stout,

strongly curved, both it and head finely and sparsely punctate.¹ Thorax about as wide as long, sides parallel from base to middle, then gradually converging to the feebly constricted apex; disk with a narrow, smooth median line, coarsely, evenly and closely punctate, the punctures ocellate, separated by about two-thirds their own diameters. Elytra conjointly oval, as wide at base as thorax; striæ fine, deep; intervals longitudinally concave, each with a single row of rather large, well separated punctures. Pygidium, under surface and femora coarsely and densely punctate. Tarsal claws connate for three-fourths their length. Prosternal groove distinct but wide and rather shallow; front and middle coxæ widely separated. Length, 3.3 mm.

Described from one specimen taken at Plummer's Island, Md., Sept. 10. During the preparation of the Barini portion of the Rhynchophora the generic placement of this specimen was the subject of quite a correspondence between Col. Casey and myself. Hoping that additional specimens might turn up it was not included in that work. It seems to form a sort of connecting link between *Baris* and *Pseudobaris*. In general facies it resembles the former group, but the widely separated front coxæ, long beak and pubescent basal joint of antennal club preclude its being placed in *Baris*. On the other hand the prosternal groove is not abrupt and narrow as in typical *Pseudobaris*. It perhaps should serve as the type of a new genus.

598 (11,177). *Nicentrus grossulus* Casey, Ann. N. Y. Acad. Sci., VII, 1893, 599.—This name and citation should replace that of *Nicentrus canus* Lec. (p. 392), Casey having wrongly identified⁵ specimens from Enterprise and Haw Creek, Fla., as Leconte's *Centrinus canus*. His correction and renaming of the species was overlooked by us. A specimen of *N. grossulus* was swept from sea blite, *Batis maritima* L., on Hog Island opposite Dunedin on March 26. It is more oblong and slender than *Limnobaris cana* Lec., is 4.5 mm. in length and densely clothed above with elongate-oval brownish-yellow scales; those on thorax arranged transversely. Known only from Enterprise, Haw Creek and Dunedin, Fla.

Eisonyx Lec. 1880, 216.

This genus is related to *Microholus* Lec. and *Oömorphidius* Casey, but differs from both in having the body rhomboidal; beak thick, shorter than thorax, feebly curved; middle and hind tibiæ very stout,

⁵ Ann. N. Y. Acad. Sci., VI, 1892, 614.

coarsely pubescent; tarsal claws single. Three species are known, two from Texas and Missouri, the other

Eisonyx (*Eumononycha*) **picipes** Pierce, Proc. U. S. Nat. Mus., LI, 1916, 472.

Rhomboidal, convex, widest between basal third and fourth of elytra. Black, feebly shining, sparsely clothed with very small patches of linear scales on base of beak, sides of thorax and bases of third and seventh elytral intervals. Beak densely, deeply and finely punctate, separated from head by a transverse, sharply defined groove. Thorax as long as wide, apex half as wide as base, disk deeply, strongly and irregularly punctate with median and discal smooth areas. Greatest width of elytra about one-half wider than that of thorax; striæ strong at base, gradually evanescent; punctuation extremely fine and sparse. Abdomen finely and sparsely punctate, the first and second segments connate at middle. Length, 2.5-3.7 mm.

Described by Pierce from several specimens taken at Nashville, Tenn., in August and September, some of them from the roots of an aster. Belongs to Casey's genus *Eumononycha*⁶ which Pierce, loc. cit., reduces to a subgenus of *Eisonyx*.

Limnobaris cana Lec., 1876, 421.

Black, shining, antennæ and legs dull red; upper surface rather thickly clothed with small oval gray scales. Beak rather stout, shorter than thorax, deeply, densely lineato-punctate, male, as long as head and thorax, slender, slightly curved, polished, punctured only at base, female. Thorax scarcely as long as wide, densely and rather coarsely punctate. Elytral striæ deep, intervals flat, rugosely punctate, the scales not arranged in rows. Fifth ventral one-half longer than fourth. Length, 4.7-5 mm.

This name and description should be inserted above Number 617, p. 402. The species is known from St. Augustine, Tybee Beach and Enterprise, Fla., and Santo Tomas, Texas.

633. **Catapastus albonotatus** Linell.—A number of specimens of this little Barid were taken by beating in the midst of the dense hammocks at Cape Sable, Fla., Feb. 21 to 23. It is the smallest member of the genus.

Barilepton robusta new species.

Elongate, robust; subcylindrical. Black, shining; legs and antennæ dull reddish-brown; above evenly and densely clothed with slate-gray scales, those on thorax lanceolate-triangular and arranged transversely, their margins contiguous; those on elytra elongate-oval, smaller, irregularly overlapping; under

⁶ Ann. N. Y. Acad. Sci., VII, 1893, 601.

surface thickly clothed with still smaller, oval, silver-gray scales. Beak stout, compressed, scarcely half as long as thorax, basal half coarsely granulate-punctate, gradually smoother towards tip. Head alutaceous, very finely and sparsely punctate. Thorax one-half longer than wide, sides parallel from base to apical third, thence converging to the strongly constricted apex, the latter one-third or more narrower than base; sculpture hidden, the median smooth line narrow, subcarinate, almost entire. Elytra as wide and three times longer than thorax, sides parallel from base to apical fifth, then feebly converging into the broadly rounded tips; striæ fine, shallow; intervals flat, alutaceous, rather coarsely, irregularly punctate. Single tarsal claw stout, as long as third tarsal joint, feebly cleft at tip. Length, 6.7-8 mm.

This handsome weevil was first taken from the margin of a lake three miles east of Lakeland, Fla., Feb. 16, 1919. Four specimens were secured by cutting off close to the ground clumps of a coarse saw-grass and shaking them over a rubber blanket. With the weevils were found a half dozen specimens of a rare Buprestid beetle, *Taphrocerus puncticollis* Schz. These two beetles, which are quite similar in form, were evidently hibernating between the bases of the leaves and stems of the saw-grass. On March 23, nine more specimens of the weevil were found in clumps of a similar saw-grass by the side of Lake Butler, near Tarpon Springs, 50 miles northwest of Lakeland. This species is twice or more larger than our other eastern members of the genus *Barilepton*. Its dense scaly slate-gray vestiture is also very distinctive.

710. *Perigaster obscura* Lec.—It is very doubtful whether this is more than a southern race or variety of *P. cretura* Herbst. Specimens have been taken about Dunedin which appear to be intermediate between the two.

The paucity of species of the tribe Ceutorhynchini in Florida is remarkable. During seven winters' collecting I have taken but five species in the State, viz., *Craponius inaequalis* Say, *Auletes nebulosus* Lec., *Ceutorhynchus floridanus* Leng, *Perigaster cretura* Herbst. and *P. obscura* Lec. Of the 66 species of the tribe recognized in the Rhynchophora 34 were recorded from Indiana and only eight from Florida, three being common to both states.

697. *Ceutorhynchus transversus* Blatch.—This was described from a unique from Starke County, Ind. Three additional specimens were taken May 5, 1918, by sweeping herbage in a low moist spot close to White River, five miles northwest of Indianapolis.

733. *Conotrachelus seniculus* Lec. This is a very common species in the Okeechobee and Cape Sable regions in early spring. It occurs on low vegetation and is also attracted to light.

737. *Conotrachelus serpentinus* Boh.—This has been taken in some numbers about Dunedin and Lakeland, Fla., where it occurs in hammocks on the foliage of the red bay, *Persea borbonia* L.

738. *Conotrachelus belfragei* Lec.—Three additional examples of this prettily marked weevil have been taken since 1916, one at Dunedin, March 14, by beating sea grape, *Coccolobis uvifera* (L.) on Hog Island, the other two at Cape Sable on *Conocarpus erecta* L. It was hitherto known only from Eustis, Fla., and Texas.

— *Conotrachelus maritimus* Blatch.—This species was described⁷ from nine specimens taken near Dunedin in February from beneath debris within 50 feet of the beach of Clearwater Bay. The species belongs in Group III, p. 476, of the Rhynchophora. Only two or three additional specimens have been since obtained.

742. *Conotrachelus floridanus* Fall.—Frequent at Cape Sable in late February, where it occurred on the dead branches and foliage of the saffron plum, *Bumelia angustifolia* Nutt. This common shrub, known to the natives of the Cape as "seaside oak," grows in dense clumps along the edges of the hammocks and was productive of more species of Coleoptera than any other half dozen forms of vegetation in that region. One of the specimens of *C. floridanus* was 6.3 mm. in length.

— *Conotrachelus biscayensis* Fall, Can. Ent., XLIX, 1917, 385.—This species was described from a unique female taken by Hubbard and Schwarz at Biscayne, Fla. Fall states that by Le Conte's table it would fall near *geminatus*, but more nearly resembles *floridanus* from which it differs in its less elongate (4.1 mm.) body and very differently sculptured ventral segments, the first being coarsely and sparsely punctate, the others smooth and polished at middle, punctate only at sides.

— *Conotrachelus obesus* Fall, loc. cit., p. 386.—Described from a single Georgia specimen, closely allied to *anaglypticus*, but larger (5 mm.), with thorax wider and elytral costæ 3, 5, 7 and 9 acutely carinate, the carinæ of the third and fifth abruptly interrupted before the middle.

⁷ Can. Ent., XLIX, 1917, 278.

748. *Conotrachelus coronatus* Lec.—A single specimen was taken near Lakeland, Feb. 16, by beating clumps of saw-grass over a rubber blanket. It is notable for its small size (3 mm.), the tubercles of thorax and elytra, and by having the beak abruptly obliquely declivent at apical third. Known heretofore only from two specimens taken by Schwarz at Enterprise, Fla.

761. *Chalcodermus inæquicollis* Horn.—A dozen or more specimens have been taken, all from the leaf axils of a thistle on Hog Island.

766. *Tyloderma maculata* Blatch.—Described from a unique taken at Little River, Fla. Two additional specimens have been taken, one near Moore Haven, Fla., March 3, the other from Hog Island, by sweeping *Batis maritima* L., March 26.

768. *Tyloderma variegata* Horn.—Taken since 1916 at La Belle, Palm Beach Canal, Lakeland and Dunedin, Fla., by sweeping ferns in dense hammocks.

— *Tyloderma lævicollis* Blatch.—This species was described⁸ from two specimens taken March 4 by beating at the point where the Palm Beach Canal leaves the east shore of Lake Okeechobee. Allied to *T. variegata* Horn, but much smaller. The elongate slender form, almost smooth thorax and deep subapical striæ of elytra readily separate this from any known species.

Tyloderma minima new species.

Oblong-oval. Black, more or less bronzed, strongly shining; legs, and rarely the entire surface, dark reddish-brown. Beak stout, one-third shorter than thorax, alutaceous, finely and very sparsely punctate. Head smooth but with a shallow oval fovea. Thorax oval, its front margin projected forward, partly covering the head, very finely alutaceous, usually absolutely smooth, rarely with a few vague, shallow punctures on front margin. Elytra elongate-oval, one-third wider at base than thorax, disk with rows of very faint punctures, these evanescent behind the middle, the subsutural row coarser and nearly entire. Under surface minutely alutaceous, impunctate. Length, 2.3–2.8 mm.

Ormond, Moore Haven, Bassenger, Sarasota and Dunedin, Fla., Jan. 11 to April 14. This is the small form mentioned (p. 494) in the notes under *T. punctata* Casey. It occurs abundantly in southern Florida beneath cover along the margins of fresh water, mating in February and March. *T. punctata*, which also occurs in small num-

⁸ Can. Ent., LI, 1919, 99.

bers in Florida, is always larger, not less than 3.5 mm., with head and subapical constriction of thorax distinctly punctured; and the punctures of elytra, especially along the flanks, very coarse. No intermediate forms have been found.

775. *Lembodes solitarius* Boh.—This curious Cryptorhynchid, usually considered rare, I found quite frequent about Cape Sable, 30 or more specimens having been taken, mostly by beating the dead limbs of *Bumelia angustifolia* Nutt.

780. *Pseudomus inflatus* Lec.—Common at Key West on the foliage of the sea-grape, *Coccolobis uvifera* L.

781. *Pseudomus sedentarius* Say.—A single example was taken at Lakeland, Fla., Feb. 13, by beating bunches of Spanish moss. Known heretofore only from Ormond and Enterprise, Fla.

784. *Acalles granosus* Lec.—Two specimens of this handsome and distinctively marked weevil were taken Feb. 17, beneath chunks of saw-palmetto stems along the edge of the beach of Clearwater Bay, one mile north of Dunedin. Hitherto known only from the east coast of that State.

791. *Acalles minimus* Blatch.—Several examples of this pygmy of the genus were taken at Cape Sable by beating in dense hammocks.

Acalles sablensis new species.

Oval, robust. Dark reddish-brown, above densely clothed with dirty gray, white and fuscous scales; the white ones forming a vague stripe each side and a quadrate spot at middle of base of thorax, and a broad common V-shaped blotch on the declivity of elytra; this bordered in front by an irregular cross band of fuscous scales, these also forming several scattered blotches on disk of thorax and basal half of elytra and a broad common one on middle of declivity. Under surface thickly clothed with round white scales. Beak broad, flattened, subspatulate, about as long as thorax, naked except at base, finely and sparsely punctate, carinate on basal third. Thorax slightly broader than long, strongly narrowed and broadly constricted in front of middle, sides rounded. Sculpture concealed, disk with numerous scattered, very short forward-inclined setae. Elytra oval, one-fourth wider at base than thorax, sides parallel to apical third, thence gradually converging to the conjointly rounded apex; sculpture of disk concealed; intervals convex, each with a single row of short white, backward-inclined bristles. Length, 3-5 mm.

Two specimens, differing much in size but otherwise very similar, were collected at Cape Sable, Fla., Feb. 21 to 23. They were taken about six miles apart by beating dead branches in dense hammocks.

No sexual differences are indicated. The larger one is duller colored, having only a trace of the basal white spot of thorax and with the median fuscous spot of elytral declivity much wider.

Pseudoacalles maculatus new species.

Broadly oval, very robust. Blackish-piceous, antennæ and tarsi reddish-brown; thorax sparsely, elytra densely, clothed with dull clay-yellow and white scales, the latter forming a narrow median line and some small spots on thorax and numerous scattered spots on each elytron. Under surface covered with larger similar scales. Beak stout, subdepressed, as long as thorax, coarsely thickly punctate, striate at sides, carinate above on basal half. Head coarsely punctate. Thorax nearly twice as wide as long, sides strongly rounded, apex distinctly constricted, disk very coarsely, densely, more or less confluent punctate, each puncture closed by a round scale. Elytra at base scarcely as wide as middle of thorax, sides feebly curved from humeri to apical third, then strongly converging to the rather narrowly rounded apex; striæ fine; intervals broad, flat, their sculpture concealed. Second and fifth ventral segments subequal in length, each more than twice as long as the third and fourth which are also subequal. Length, 4.2 mm.

Described from a single specimen taken February 25, by sweeping at Cape Sable. Larger and much more robust than *P. nuchalis* Lec., with thorax much wider, its apex more suddenly constricted. The elytra are prettily mottled and without setæ, but each interval of the declivity has a median row of slightly larger, more projecting pale scales.

803. *Cryptorhynchus lapathi* Linn.—Taken in some numbers on willow near Indianapolis in June, 1917. The first record for the State.

805. *Cryptorhynchus helvus* Lec.—A single specimen is at hand from Gainesville, Fla., and another is in the Leng collection without locality label. These are the only ones, other than the type, so far known.

810. *Cryptorhynchus apiculatus* Gyll.—A few specimens are taken each spring near Dunedin by beating dead branches in wet hammocks. One was also taken near Okeechobee City, March 6.

812. *Cryptorhynchus schwarzi* Blatch.—Four specimens have been taken by me since 1916, one at Moore Haven, another at Cape Sable, from between grass roots close to the beach, and two by beating buttonwood, *Conocarpus erecta* L., on Hog Island, opposite Dunedin, March 8.

818. *Anchonus duryi* Blatch.—Taken in company with *Conotrachelus maritimus* Bl. from beneath chunks along the bay front at Dunedin.

822. *Dryotribus mimeticus* Horn.—Frequent at Cape Sable in company with *Gononotus angulicollis* Suffr. beneath logs along the beach, the latter species occurring by hundreds.

839. *Caulophilus latinasus* Say.—Found hibernating in large bunches of Spanish moss along the borders of lakes near Lakeland, Fla., a dozen or more specimens having been taken in February.

879. *Sphenophorus chittendeni* Blatch.—Three additional specimens of this well marked species have come to hand since 1916, two from Dunedin, the type locality, where they were found crawling on the sidewalk, the other from Billy's Island, Ga. Chittenden reports another in his collection from Eaugallis, Fla. The males are distinctly the smaller and more slender and the smooth median area of thorax varies much in form and size.

— *Sphenophorus deficiens* Chitt. Mss.—One specimen, to which Dr. Chittenden gives this name, was taken by me from beneath a log on the ocean beach at Ormond, Fla., March 15. His type is from Crescent City, Fla. It is closely related to *sea* Walsh, but is larger, with beak stouter at base and the lateral vittæ of thorax almost obliterated.

***Sphenophorus omissus* new species.**

More slender than its nearest ally, *S. sea* Walsh. Black, feebly shining; antennæ and tarsi dark reddish-brown. Beak slender, one-half as long as thorax, strongly compressed beyond the antennal fossæ, both it and head minutely and sparsely punctate, without basal or frontal groove. Thorax about one-third longer than wide, sides parallel from base to apical third, then rounded to the constricted apex; disk without elevated vittæ; rather finely and irregularly punctate and with a narrow smooth median line on apical half, much more coarsely and sparsely punctate on basal portion. Elytra as wide at base as thorax, widest just behind humeri, the sides thence regularly converging to the conjointly narrowly rounded tips; intervals of disk flat, sinuous, each with a row of minute punctures; striæ with very coarse punctures which cause the sinuosity of the intervals. Pygidium coarsely and shallowly punctate. Abdomen coarsely and sparsely punctate, the first and second segments broadly and shallowly concave in male. Length, 6.3 mm.

Two specimens collected March 31 from beneath log near border of pond at Dunedin, Fla. Belongs under *gg* of Group D (p. 561), but

in general facies and sculpture of elytra resembles *zea*; from which it is at once distinguished by the lack of thoracic vittæ.

885a. *Sphenophorus callosus sublævis* Chitt.—Dr. Chittenden (Ms.) states: "This species (*sublævis*) is absolutely not a variety of *callosus*. It is more nearly related to *destructor* Chittn., from which it is separated by its much more irregular elytral surface. I freely admit that the distinction (between *destructor* and *sublævis*) is not very strong, but I find no specimens which intergrade sufficiently to separate *sublævis* as a race of the other." The Vigo County, Ind., specimen recorded (p. 568) he places as *destructor*, the Lake County ones as *sublævis*. He also adds: "*S. destructor* is one of the variable species and I have found it on occasions in the same lot with *callosus* but have no trouble in separating it from that species by the characters of the thorax alone, the middle vitta being irregular, elongate fusiform, with an irregular interrupted, shining black elevated line extending from apex to near base. This finely elevated line is never found in *callosus*." Basing conclusions on small series, Dr. Chittenden is justified in his statement, but if a collection from the entire country were brought together, it would perhaps show that *destructor*, *callosus* and *sublævis* would merge, *sublævis* being the northern race of the other two, the typical form being *callosus*. All three are also closely related to *S. zea* Walsh.

889a. *Calandra oryzae zea-mais* Mots.—Of this form Dr. Chittenden (Ms.) says: "This is an absolute synonym of *oryza*. Years of experience in rearing this insect has convinced me that it is not divisible into distinct species or even races. The size is dependent upon the food supply. Large specimens are usually bred from comparatively soft corn where they have an abundance of food; small ones from small grains of hard rice."

ERRATA AND SUGGESTED CHANGES IN THE TEXT OF THE RHYNCHOPHORA
OF NORTHEASTERN AMERICA.

Page.

30. Fourth line under *Eurymycter*.—Change "from above" to "from the sides and below."
47. Fifth line from bottom, insert "bust."
164. Change Roman numeral before *Hyperodes* to V.

268. Col. Robinson suggests that "Basal part of" should be inserted after *a* and *aa* of key, as in all species the distal part of the tooth is at right angles with femur. He also suggests that "pubescence condensed on and behind scutellum" should be omitted from *aa* as this is true of all members of the group.
299. Insert "not" after "color" in *c* of key.
349. Last line in *bb* of first key, cut out "or longer than" and insert "as."
386. Change numbers and name of second species to:
587 (11,168). *Odontocorynus pinguescens* Casey, 1892, 599.
425. Fourteenth line, insert "usually" before "prolonged."
426. Second line of *bb* of key, insert "to cut off the third" after "prolonged."
431. Exchange the second line of the description of *Acanthoscelis curtus* Say for the second line of that of *Acanthoscelis mendicus* Dietz. In making corrections of the two lines the printer put each one back in the wrong place.
440. First line, add "to cut off the third" after "sides."
443. Serial number 694 should be 684.
444. Line beginning with "channel" under No. 686 should take the place of line beginning with "channel" under No. 687, and vice versa.
454. In third line of *cc* of key add "except in *Rhinoncus*."
537. Fifth line under Rhyncolini, change "latter" to "former."
540. Insert (11,227) after the serial number 847.

COLEOPTERA COLLECTED AT WINDSOR, BROOME
CO., N. Y., 26 MAY TO 5 JUNE, 1918, WITH
NOTES AND DESCRIPTIONS.

BY HOWARD NOTMAN,

BROOKLYN, N. Y.

CICINDELIDÆ.

Cicindela sexguttata Fabr. (10)

Cicindela purpurea Oliv. (4)

Cicindela purpurea,

var. *graminea* Schp. (1)

Cicindela repanda Dej. (9)

CARIBIDÆ.

Carabus limbatus Say. (1)
Calosoma calidum Fabr. (1)
Elaphrus cicatricosus Lec. (1)
Elaphrus ruscarius Say. (12)
Nebria pallipes Say. (5)
Dyschirius globulosus Say. (1)
Clivina impressifrons Lec. (1)
Schizogenius lineolatus Say. (9)
Schizogenius amphibius Hald. (1)
Bembidium punctatostriatum Say. (8)
Bembidium inaequale Say. (13)
Bembidium honestum Say. (1)
Bembidium nigrum Say. (2)
Bembidium simplex Lec. (4)
Bembidium planiusculum Mann. (2)
Bembidium complanatum Mann. (2)
Bembidium basicorne n. sp. (3)
Bembidium fugax Lec. (3)
Bembidium planum Hald. (17)
Bembidium grandiceps Hayw. (18)
Bembidium picipes Kby. (11)
Bembidium postremum Say. (1)
Bembidium oberthürri Hayw. (1)
Bembidium variegatum Say. (1)
Bembidium posticum Hald. (3)
Bembidium patruale Dej. (49)
Bembidium decipiens Dej. (6)
Bembidium versicolor Lec. (5)
Bembidium 4-maculatum Linn. (10)
Bembidium semistriatum Hald. (8)
Tachys scitulus Lec. (6)
Tachys corruscus Lec. (4)
Tachys laevis Say. (11)
Tachys tripunctatus Say. (18)
Tachys incurvus Say. (23)
Pterostichus honestus Say. (2)
Pterostichus stygicus Say. (3)
Pterostichus lucublandus Say. (17)
Pterostichus luctuosus Dej. (1)
Pterostichus erythropus Dej. (4)
Amara angustata Say. (3)
Amara pallipes Kby. (3)
Amara aneopolita Csy. (1)
Amara edax n. sp.

Platynus angustatus Dej. (1)
Platynus decens Say. (1)
Platynus reflexus Lec. (1)
Platynus extensicollis Say. (15)
Platynus anchomenoides Rand. (5)
Platynus atratus Lec. (3)
Platynus melanarius Dej. (5)
Platynus cupripennis Say. (17)
Platynus nitidulus Dej. (2)
Platynus picipennis Kby. (1)
Galerita janus Fabr. (5)
Lebia atriventris Say. (1)
Lebia viridis Say. (7)
Lebia ornata Say. (5)
Apristus cordicollis Lec. (2)
Brachynus ballistarius Lec. (1)
Brachynus fumans Fabr. (1)
Agonoderus pallipes Fabr. (1)
Agonoderus comma Fabr. (7)
Harpalus vulpeculus Say. (1)
Harpalus viridianus Beauv. (3)
Harpalus compax Lec. (1)
Harpalus pleuriticus Kby. (1)
Harpalus viduus Lec. (1)
Stenolophus fuscatus Dej. (1)
Stenolophus rotundatus Lec. (5)
Bradycellus rupestris Say. (1)
Bradycellus debilis Say. (6)
Bradycellus tantillus Chd. (1)
Philodes testaceus Lec. (1)
Anisodactylus harrisii Lec. (4)
Anisodactylus nigerrimus Dej. (2)
Anisodactylus discoideus Dej. (1)

DYSTICIDÆ.

Laccophilus maculosus Germ. (13)
Bidessus affinis Say. (4)
Hydroporus modestus Aubé. (3)
Ilybius biguttulus Germ. (1)

GYRINIDÆ.

Gyrinus limbatus Say. (7)
Gyrinus dichrous Lec. (2)
Dineutes discolor Aubé. (14)

HYDROPHILIDÆ.

Tropisternus glaber Hrbst. (1)
Laccobius agilis Rand. (8)
Philhydrus cinctus Say. (1)
Philhydrus perplexus Lec. (1)
Cymbiodyta fimbriata Mels. (2)
Cymbiodyta blanchardi Horn. (2)
Creniphilus digestus Lec. (9)
Spharidium scarabæoides Linn. (2)
Cercyon unipunctatus Linn. (1)
Cercyon incrematus n. sp.
Cercyon basillaris n. sp.
Cryptopleurum minutum Fabr. (1)

SILPHIDÆ.

Necrophorus marginatus Fabr. (2)
Silpha inæqualis Fabr. (1)
Silpha noveboracensis Forst. (1)
Colon asperatum Horn. (1)
Anisotoma punctatostriata Kby. (1)
Liodes obsoleta Mels. (1)
Agathidium exiguum Mels. (7)

SCYDMENIDÆ.

Scydmanus perforatus Schm. (2)

PSELAPHIDÆ.

Pilopius lacustris Csy. (1)
Decarthron exiguum n. sp.
Batrisodes spretus Lec. (1)
Rhexius insculptus Lec. (3)

STAPHYLINIDÆ.

Paralesteza pallipes Lec. (13)
Geodromicus brunneus Say. (2)
Trogophlæus quadripunctatus Say. (10)
Trogophlæus morio Er. (11)
Trogophlæus rizaris Mots. (12)
Trogophlæus difficilis Csy. (1)
Trogophlæus volans n. sp.
Trogophlæus vespertinus n. sp.
Trogophlæus subtilis Er. (1)
Trogophlæus pudicus Csy. (1)
Oxytelus laqueatus Marsh. (1)
Oxytelus nitidulus Grav. (2)

Oxytelus tetracarínatus Block. (1)
Platystethus americanus Er. (1)
Bledius fracticornis Payk. (4)
Bledius emarginatus Say. (4)
Stenus bipunctatus Er. (10)
Stenus fulvoguttatus n. sp.
Stenus junco Fabr. (1)
Stenus edax n. sp.
Stenus perexilis n. sp.
Stepus obtusus Csy. (10)
Stenus colonus Er. (7)
Stenus flavicornis Er. (9)
Stenus canadensis Csy. (1)
Stenus punctatus Er. (2)
Stenus canicollis Ntm. (5)
Euæsthetus americanus Er. (1)
Gastrolobium bicolor Grav. (2)
Hesperobium cribratum Lec. (1)
Pæderus littorarius Grav. (10)
Lathrobium procerum Csy. (1)
Lathrobium armatum Say. (1)
Lathrobioma othioides Lec. (1)
Lathrobioma tenuis Lec. (1)
Lathrobiella collaris Er. (19)
Lathrobiella fragilis Csy. (2)
Scopæus quadriceps Ntm. (2)
Astenus discopunctatus Say. (6)
Gyrohypnus melanops Csy. (1)
Gyrohypnus fusciceps Lec. (2)
Neobisnius sobrinus Er. (3)
Neobisnius paderoides Lec. (2)
Neobisnius terminalis Lec. (3)
Philonthus quadricollis Horn. (1)
Philonthus lomatus Er. (2)
Philonthus blandus Grav. (1)
Staphylinus badipes Lec. (1)
Staphylinus maculosus Grav. (1)
Ontholestes cingulatus Grav. (1)
Creophilus maxillosus,
 var. *villosus* Grav. (1)
Acylophorus pronus Er. (3)
Tachinus repandus Horn. (1)
Tachyporus jocosus Say. (2)
Tachyporus chrysomelinus Linn. (2)
Tachyporus brunneus Fabr. (3)

Conosoma opicum Say. (1)
Boletobius cincticollis Say. (1)
Boletobius quæstor Horn. (1)
Bryoporus rufescens Lec. (1)
Myllæna vulpina Bernh. (3)
Silusida blanchardi Csy. (3)
Gyrophæna flavicornis Mels. (34)
Hoplandria lateralis Mels. (8)
Atheta nigrifila Grav. (3)
Atheta dentata Bernh. (6)
Atheta palustris Kiesw. (15)

Pelurga luridipennis Mann. (1)
Daya ingratus Csy. (1)
Metaxya magniceps Sahl. (16)
Aleoconota cambrica Wollas. (4)
Pancota panda Csy. (13)
Coprothassa sordida Marsh. (2)
Colpodota parva Sahl. (1)
Gnypeta baltifera Lec. (2)
Tachyusa cavicollis Lec. (14)
Falagria dissecta Er. (1)
Aleochara bimaculata Grav. (1)
Oxytropa schaefferi n. sp.
Oxytropa obliqua Csy. (1)

TRICHOPTERYGIDÆ.

Ptenidium foveicollis Lec. (1)
Trichopteryx aspera Hald. (1)
Trichopteryx discolor Hald. (16)
Smicrus filicornis Fairm. (1)

SCAPHIDIIDÆ.

Scaphisoma rubens Csy. (8)

PHALACRIDÆ.

Stilbus atomarius Linn. (14)

COCCINELLIDÆ.

Megilla maculata DeG. (1)
Adalia bipunctata Linn. (1)

EROTYLIDÆ.

Languria mozzardi Lat. (3)
Acropteroxys gracilis Newm. (2)
Tritoma thoracica Say. (2)

Tritoma flavicollis Lac. (6)

COLYDIDÆ.

Cerylon castaneum Say. (2)
Philothermus glabriculus Lec. (1)

CUCUJIDÆ.

Silvanus planatus Germ. (1)
Lamophlaeus convexulus Lec. (1)
Lamophlaeus adustus Lec. (2)

CRYPTOPHAGIDÆ.

Tomarus pulchellus Lec. (26)
Agathengis lineola Ntm. (1)
Atomaria pusilla Payk. (1)
Atomaria ochracea Zimm. (1)
Atomaria ochracea,
 var. *pennsylvanica* Csy. (1)
Atomaria oblongula Csy. (11)
Atomaria ephippiata Zimm. (3)

MYCETOPHAGIDÆ.

Mycetophagus picta Csy. (1)

DERMESTIDÆ.

Dermestes lardarius Linn. (1)
Attagenus deficiens Csy. (2)

HISTERIDÆ.

Hister abbreviatus Fabr. (1)
Hister lecontei Mars. (4)
Aeletes politus Lec. (1)

NITIDULIDÆ.

Ephura peltoides Horn. (1)
Ephura labilis Er. (1)
Soronia undulata Say. (1)
Cylloides biplagiatus Lec. (7)
Cychramus adustus Er. (1)
Cryptarcha ampla Er. (1)
Ips quadriguttatus Fabr. (1)

LATHRIDIDÆ.

Lathridius livatus Lec. (2)
Corticaria serrata Payk. (1)

Melanophthalma picta Lec. (2)
Melanophthalma villosa Zimm. (8)
Melanophthalma distinguenda Com. (7)
Melanophthalma longipennis Léc. (1)
Melanophthalma cavicollis Mann. (4)

BYRRHIDÆ.

Cytilus sericeus Forst. (1)
Syncalypta spinosa Rossi. (4)

PARNIDÆ.

Psephenus lecontei Lec. (1)

HETEROCERIDÆ.

Heterocerus ventralis Mels. (1)

DASYLLIDÆ.

Cyphon obscurus Guér.

ELATERIDÆ.

Adelocera oblecta Say. (1)
Hypnoidus planatus Lec. (1)
Hypnoidus striatulus Lec. (6)
Hypnoidus melsheimeri Horn. (4)
Hypnoidus obliquatus Mels. (3)
Monocrepidius auritus Hbst. (1)
Elatér nigricollis Hbst. (1)
Elatér vitiosus Lec. (1)
Elatér nigricans Germ. (2)
Elatér rubricus Say. (1)
Elatér areolatus Say. (1)
Agriotes mancus Say. (2)
Agriotes pubescens Mels. (12)
Dolopius lateralis Esch. (4)
Melanotus difficilis Blatch. (1)
Limoniüs griseus Beauv. (1)
Limoniüs anceps Lec. (12)
Sericus incongruus Lec. (5)
Sericus silaceus Say. (1)
Sericus flavipennis Mots. (1)
Ludius tessellatus Linn. (2)
Ludius hieroglyphicus Say. (1)

THROSCIDÆ.

Throscus constrictor Say. (3)

BUPRESTIDÆ.

Dicerca prolongata Lec. (6)
Anthaxia quercata Fabr. (1)
Chrysobothris femorata Fabr. (13)
Chrysobothris soror Lec. (1)
Agrilus vittaticollis Rand. (3)
Agrilus acutipennis Mann. (1)
Agrilus politus Say. (1)
Agrilus obsoletoguttatus Gory. (1)
Taphrocerus gracilis Say. (4)
Brachys ovata Web. (2)
Brachys ærosa Mels. (8)
Brachys æruginosa Gory. (16)
Pachyscelus purpureus Say. (1)

LAMPYRIDÆ.

Lucidota punctata Lec. (2)
Ellychnia corrusca Linn. (1)
Pyractomena angulata Say. (1)
Photuris pennsylvanica DeG. (2)
Podabrus rugulosus Lec. (2)
Podabrus basillaris Say. (3)
Podabrus modestus Say. (1)
Podabrus punctatus Lec. (2)
Telephorus dentiger Lec. (2)
Telephorus fraxini Say. (1)
Telephorus carolinus Fabr. (4)
Telephorus nigrifolius Lec. (1)
Telephorus flavipes Lec. (6)
Telephorus rotundicollis Say. (1)
Telephorus bilineatus Say. (1)
Malthodes exilis Mels. (1)
Malthodes fuliginosus Lec. (2)

MALACHIIDÆ.

Malachius æneus Linn. (2)
Pseudebæus oblitus Lec. (1)
Hydnocera tabida Lec. (2)
Hydnocera longicollis Ziegl. (6)

PTINIDÆ.

Ernobius mollis Linn. (1)

LUCANIDÆ.

Platycerus quercus Fabr. (1)
Ceruchus piceus Web. (1)

SCARABÆIDÆ.

- Onthophagus pennsylvanicus* Har. (1)
Onthophagus hecate Panz. (1)
Atanius strigatus Say. (1)
Dialytes striatulus Say. (1)
Aphodius fimetarius Linn. (2)
Aphodius fossor Linn. (4)
Odontæus filicornis Say. (1)
Geotrupes splendidus Fabr. (1)
Hoplia trifasciata Say. (2)
Dichelonycha diluta Fall. (5)
Dichelonycha testacea Kby. (4)
Dichelonycha elongata Fabr. (3)
Serica vespertina Gyll. (1)
Diplotaxis atlantis Fall. (1)
Lechnosterna anxia Lec. (1)
Euphoria fulgida Fabr. (1)
Cremastochilus canaliculatus Kby. (2)
Trichius affinis Gory. (4)

CERAMBYCIDÆ.

- Cyrtophorus verrucosus* Oliv. (3)
Pachyta monticola Rand. (3)
Acmæops thoracica Hald. (4)
Leptura lineola Say. (5)
Leptura aurata Horn. (1)
Leptura mutabilis Newm. (3)
Psenocerus supernotatus Say. (1)
Saperda concolor Lec. (1)
Oberea bimaculata Oliv. (1)
Oberea filum Csy. (4)

CHRYSOMELIDÆ.

- Donacia emarginata* Kby. (1)
Syneta ferruginea Germ. (1)
Anomala laticlavata Forst. (2)
Chlamys plicata Fabr. (1)
Exema dispar Lac. (3)
Cryptocephalus quadruplex Newm. (1)
Pachybrachys bivittatus Say. (19)
Typhophorus canellus
 var. *sellatus* Horn. (1)
 var. *scutellaris* n. var.
 var. *pumilus* Lec. (1)
 var. *quadriguttatus* Lec. (1)

var. *vittatus* Horn. (1)

- Xanthonia decemnotatus* Say. (1)
Graphops marcessitus Cr. (1)
Chrysodina globosa Oliv. (3)
Calligrapha similis Rogers. (4)
Calligrapha elegans (1)
Calligrapha bigsbyana Kby. (2)
Plagioderma versicolor Laich. (1)
Gastroidea polygoni Linn. (1)
Lina tremula Fabr. (4)
Gonioctena pallida Linn. (1)
Phyllodecta vitellina Linn. (5)
Luperodes cyanellus Lec. (4)
Diabrotica vittata Fabr. (1)
Galerucella americana Fabr. (2)
Galerucella servitata Lec. (2)
Galerucella cavicollis Lec. (4)
Galerucella tuberculata Say. (1)
Galerucella decora Say. (7)
Hypolamps pilosa Illig. (1)
Ædionychis limbata Mels. (2)
Ædionychis quercata Fabr. (3)
Haltica ignita Illig. (8)
Haltica fuscoænea Mels. (1)
Crepidodera helvina Linn. (13)
Crepidodera rufipes Linn. (2)
Epitrix cucumeris Harris. (6)
Mantura floridana Cr. (3)
Systema hudsonia Forst. (13)
Microrhopala excavata Oliv. (1)
Microrhopala vittata Fabr. (2)
Chalepus ruber Web. (2)
Chalepus nervosa Panz. (8)
Physonota unipunctata Say. (2)
Coptocycla bicolor Fabr. (2)
Coptocycla signifera Hrbst. (1)

TENEBRIONIDÆ.

- Nyctobates pennsylvanica* DeG. (1)
Iphthimus opacus Lec. (1)

CISTELIDÆ.

- Isomira quadristriata* Coup. (1)

LAGRIIDÆ.

- Arthromacra ænea* Say. (9)

MELANDRYIDÆ.

Melandrya striata Say. (1)*Canifa pallipes* Mels. (2)

CEPHALOIDÆ.

Cephaloön lepturides Newm. (1)

MORDELLIDÆ.

Anaspis rufa Say. (2)*Mordellistena aspersa* Mels. (1)*Mordellistena pustulata* Mels. (1)*Mordellistena convicta* Lec. (3)*Mordellistena morula* Lec. (4)

ANTHICIDÆ.

Corphyra lugubris Say. (1)*Anthicus festinans* Csy. (3)

MELOIDÆ.

Pomphopaa sayi Lec. (4)

CURCULIONIDÆ.

Attelabus rhois Boh. (7)*Hormorus undulatus* Uhler. (2)*Phyælis rigidus* Say. (4)*Apion pennsylvanicum* Boh. (1)*Apion impeditum* Fall. (1)*Phytonomus meles* Fabr. (1)*Phytonomus polygoni* Fabr. (1)*Phytonomus nigrirostris* Fabr. (1)*Hyperodes sparsus* Say. (1)*Hypomolyx piceus* DeG. (1)*Bagous mammillatus* Say. (2)*Anthonomus robustulus* Lec. (4)*Anthonomus sycophanta* Walsh. (2)*Anthonomus rufipennis* Lec. (1)*Anthonomus consimilis* Dietz. (2)*Anthonomus musculus* Say. (1)*Orchestes niger* Horn. (1)*Orchestes pallicornis* Say. (1)*Tychius picirostris* Fabr. (5)*Tyloderma foveolata* Say. (2)*Tyloderma nigra* Csy. (1)*Cryptorhynchus lapathi* Linn. (1)*Auleutes asper* Lec. (3)*Ceutorhynchus cyanipennis* Germ. (1)*Ceutorhynchus punctiger* Sahlb. (3)*Ceutorhynchus semirufus* Lec. (1)*Pelenomus sulcicollis* Fabr. (4)*Rhinoncus pyrrhopus* Lec. (2)*Sphenophorus melanocephalus* Fabr. (2)

SCOLYTIDÆ.

Pityophthorus consimilis Lec. (1)*Xyloterus politus* Say. (1)*Dryocates americanus* Hopk. (1)*Ips grandicollis* Eich. (1)*Micracis asperulus* Lec. (1)

ANTHRIIDÆ.

Eurymycter fasciatus Oliv. (1)*Brachytarsus tomentosus* Say. (1)

NOTES AND DESCRIPTIONS.

Bembidium simplex Lec.*Bembidium planiusculum* Mann.*Bembidium complanulum* Mann.

Abundant material is at hand which is separable into these three species as defined by Hayward. Though not abundant at Windsor, they may be collected in some numbers along the more elevated streams in the Adirondack Mts. At lower elevations they are replaced by *B. planum* Hald. and *B. grandiceps* Hayw., which are similar in their habits. The author believes that the species named

B. rusticum which Col. Casey describes from the Catskill Mts. is the same species which Hayward describes as *B. planiusculum* Mann. (Mem. Col., VIII, p. 33). Col. Casey believes that *B. planiusculum* and *B. complanulum* belong in the next group of his synopsis (l. c., p. 37). He separates the two groups (erasum) and (planatum) by the convexity of the body and the strength of the outer striae of the elytra. It should be noticed, however, that although he places *rusticum* in the group (erasum) in which the body is more convex and the outer striae obsolete, he describes the species as having the seventh stria distinct and the body rather depressed.

***Bembidium basicorne* new species.**

Form rather short and broad, depressed, not very distinctly oval. Color black, rarely with a feeble metallic shimmer on the head and thorax; antennae, side margins of the thorax and elytra and the apical half of the sutural margins of the latter piceous; first joint of the antennae bright rufous; femora blackish piceous, apices of the latter and the tibiae paler, tarsi brownish testaceous; palpi brownish. Head finely, thorax very obsoletely alutaceous. Elytra polished, shining, distinctly opalescent. Head about three fourths the width of the thorax, distinctly wider than the thorax at apex; eyes strongly convex, frontal grooves broad, strong, connected with the foveate punctures of the clypeus; antennae moderately long and slender, reaching the basal third of the elytra; joints about three times as long as wide. Thorax one third wider than long; about three fifths the width of the elytra, base slightly narrower than the apex; sides strongly rounded in front, oblique and slightly sinuate behind the middle; posterior angles sharp and minutely rectangular, apex strongly emarginate, apical angles prominent, rounded; side margins rather wide, narrowly reflexed at edge; basal impressions broad rather deep, bistriate, obsoletely sculptured, carinae rather long and strong, median line strong, distinctly impressed, subentire. Elytra about one third longer than wide, sides feebly arcuate and divergent to apical two fifths, thence strongly rounded to the apex; the first four striae distinct on the disk, the first two entire; outer striae apex; the first four striae distinct on the disk, the first two entire; outer striae very close to the margin, confluent with it at basal fourth; the striae extremely minutely and indistinctly punctate. The third stria bipunctate, the anterior at basal third, the posterior at nearly apical fourth. Length 3.75 mm.; width, 1.5-1.6 mm. ♂♀. Three specimens.

This species is allied to *B. iridescens* Lec. It occurs in the Adirondack Mts. in numbers with the above three species and shows no variation of importance. It differs from *iridescens* in the absence of the pale area at the apex of the elytra, its dark legs, the thorax slightly

narrower at base; the elytral apex more obtusely rounded and its smaller size. It differs from *impium* Csy. in its form and the color of its legs.

Amara edax new species.

Form, rather short, broad and convex. Color black with an extremely feeble metallic lustre, legs black; tibiae and tarsi dark rufo-piceous, three basal joints of the antennae rufo-testaceous, outer joints fuscous. Head and thorax smooth, strongly shining, very finely alutaceous in the basal angles; elytra very finely alutaceous but shining. Head scarcely one half the width of the thorax, slightly narrower than the apex; striae scarcely apparent; antennae not quite reaching the base of the thorax; third joint strongly carinate on basal third. Thorax one half wider than long, just perceptibly narrower than the elytra, widest one third before the base, sides strongly and evenly rounded, apex about one half the width of the base, strongly emarginate, apical angles narrowly rounded; basal angles rounded, rather strongly bent back; puncture nearly twice as far from the side as from the basal margin; median line fine, distinctly impressed; anterior transverse impression feeble, basal impressions and foveae altogether obsolete, basal area impunctate, surface evenly convex. Elytra one third longer than wide, sides evenly arcuate from about the middle to the apex, apical sinuses distinct. Striae fine, impunctate; the scutellar with an ocellate puncture at base, not joined to the first at apex; punctures of the eighth stria with three wide intervals at middle; elytral intervals almost flat. Length, 7.35 mm.; width, 3.5 bb. ♂. One specimen.

This species is probably close to *A. laurana* Csy. described from Boulder Co., Col. The form is broader, the elytra shorter, the thorax distinctly wider before the base with the sides more evenly arcuate, the hind angles rounded, punctures nearer the basal margin.

Cercyon incrematus new species.

Form oval, widest near the base of the elytra, moderately convex. Color black, side margins of the thorax rather broadly and indefinitely dark rufous; elytra dark rufo-piceous, apical third and broad side margins rather indefinitely obscure testaceous; antennae, mouth parts and legs rufo-piceous. Head moderately closely and somewhat finely punctate, about one half the width of the thorax. Thorax more than twice as wide as long, sides more strongly arcuate and narrowed in front; basal marginal line extending to the fourth elytral stria, surface moderately closely and somewhat finely punctate, scarcely less closely on the sides. Elytra not quite three times the length of the thorax, one third longer than wide, widest at basal fourth where they are distinctly wider than the thorax, thence narrowed and feebly arcuate to about apical third, thence acutely rounded to the apex; ten striate, striae not closely punc-

tate, punctures separated by about their diameters, all the striae abbreviated at base, the first four very faint in the scutellar area; intervals more finely and less closely punctate than the striae, eighth interval with a somewhat irregular double row of punctures. Body beneath black, opaque. Prosternum carinate; metasternal area shining, punctures fine, separated by about twice their diameters; area not extended by an oblique line to the anterior angles. Anterior tibiae not emarginate at apex. Length, 2.5 mm.; width, 1.7 mm. One specimen.

Cercyon basillaris new species.

Form elongate-oval, widest near the base of the elytra, moderately convex. Color black, elytra rufo-piceous, scarcely indefinitely paler at the extreme apex, narrow basal margin and the first interval to the middle blackish; mouth parts and femora piceous, tibiae and tarsi paler, rufo-piceous. Head moderately closely, somewhat less faintly punctate than in the preceding; one half the width of the thorax. Thorax more than twice as wide as long, sides evenly, gradually narrowed and arcuate from base to apex; basal marginal line extending inwards only as far as the sixth stria, surface moderately closely and somewhat finely punctate, not at all sparser on the sides. Elytra rather more than three times the length of the thorax, nearly one half longer than wide, widest at basal fourth where it is distinctly wider than the thorax; form just perceptibly angulate at this point due to the feeble and flattened arcuation of the thorax; sides posteriorly nearly evenly narrowed and arcuate to the apex. Elytra ten striate, tenth subobsolete, striae punctate, punctures separated by about their diameters, punctures of the intervals finer, not at all dense, less distinct towards the apex. Eighth interval narrow with a single very irregular row of punctures. Body beneath black, subopaque, metasternal area shining, punctate, punctures a little sparse and irregular, area not extended by an oblique line to the anterior angles. Anterior tibiae not emarginate at apex. Length, 2.75 mm.; width, 1.7 mm. One specimen.

The species which Horn describes as *C. quisquilius* does not agree at all well with the descriptions of the European authors. It is possible that the above described *C. basillaris* may be Horn's species. It seems doubtful, however, because the eighth elytral interval is narrow and uniseriately punctate and the sides of the thorax are not pale. In *C. incrematus* the form of the thorax does not agree with Horn's description and the elytra have a distinct apical pale area which extends along the sides to the base.

Decarthron exiguum new species.

Form moderately slender. Color uniform brown, legs and antennae not paler. Head to the clypeal margin one half wider than long, eyes very large and convex, occupying the whole side of the head, tempora lacking; head be-

hind the eyes very oblique; occiput with two large foveæ which are separated from each other by a little less than twice the distance between them and the eyes; antennæ rather stout, as long as the head and thorax, first joint one half longer than wide, obconic, second square, as long as wide, third and fourth as long as wide, decreasing slightly in size, five to nine transverse, five just visibly so, nine twice as wide as long and about twice the width of the second; terminal joint wider than the ninth, slightly elongate, oval-conic. Head finely pubescent but not visibly punctate. Thorax one fourth wider than long, widest at apical two thirds where it is rather broadly rounded, straight and slightly convergent posteriorly. Fovea large, round and deep, surface punctulate. Pubescence not dense, pale and decumbent, moderately long. Elytra one fourth wider than long, scarcely wider at base than the greatest width of the thorax; humeri oblique, not at all prominent, sides divergent, feebly arcuate, nearly straight in front, surface moderately convex, discal striæ distinct to apical third, punctulate, the pubescence rather coarse, dense and decumbent, pale in color. Carinæ of the first abdominal segment straight, divergent, half the length of the segment, separated by half the width of the segment between the margins. Length, 1.2 mm.; width, .5 mm. ♀. One specimen.

This species resembles *D. formaceti* Lec. It may be distinguished as follows: antennæ shorter and stouter, funicular joints nearly all transverse; thorax more transverse and more broadly rounded on the sides. Elytra slightly more transverse, less convex, sides less strongly arcuate, humeri much less prominent; color yellow brown without the strong reddish tinge characteristic of *formaceti*; pubescence coarser.

Trogophlæus volans new species.

Form somewhat slender, piceous, abdomen black; three basal joints of the antennæ and the legs dull rufous. Pubescence rather short, fine and dense, pale cinereous, more conspicuous on the abdomen, less so on the head and thorax. Head slightly transverse, slightly narrower than the thorax, convex, prominences moderately strong; punctures rather coarse, very dense and evenly distributed but distinct, separated by slightly more than their diameters; eyes large, rather strongly convex; tempora less prominent, broadly rounded, one half the diameter of the eye; antennæ slender, feebly and gradually incrassate, not reaching the base of the thorax, third joint three fourths the length of the second, the latter twice as long as wide, fourth scarcely elongate, fifth distinctly so, ninth and tenth slightly transverse. Thorax one fifth wider than long, widest at apical third where it is three fourths the width of the elytra, sides rather broadly rounded anteriorly, nearly straight and convergent posteriorly, base nearly four fifths the width of the apex; discal impressions moderately distinct, more or less interrupted at middle; punctures similar in size to those of the head, evenly distributed, a little more closely placed.

Elytra one fifth longer than wide, one half longer than the thorax; punctures nearly twice the size of those on the thorax, separated by about their diameters, interspaces slightly rugulose, shining; strongly impressed along the suture from base to apical third. Abdomen slightly narrower than the elytra at base, as wide at the apex of the fifth segment; surface reticulate, very finely, moderately punctate. Length, 1.9–2.25 mm.; width, .5–.6 mm. Seven specimens.

This species is an intermediate form between groups IV and V of Casey's synopsis. It would be distinguished from *delicatus* Csy. by its larger size, narrower thorax, not transverse fourth antennal joint.

Trogophlœus vespertinus new species.

Form somewhat slender, rather depressed; piceous, abdomen black, elytra somewhat paler, three basal joints of the antennæ and legs brownish testaceous. Pubescence pale, fine, short and dense. Integuments feebly shining; head, thorax and elytra very finely, densely and shallowly punctate throughout, elytra slightly more coarsely but no less densely. Head slightly transverse, scarcely narrower than the thorax; eyes large but only moderately convex, coarsely faceted; tempora slightly less prominent, broadly rounded, one half the diameter of the eye; frontal prominences strong, antennæ reaching the base of the thorax, somewhat stout, second joint as long as the next two and much stouter, fourth joint slightly transverse, fifth larger, quadrate, sixth to tenth distinctly transverse, tenth one third wider than long. Thorax one fourth wider than long, widest at apical third where it is just perceptibly narrower than the elytra, sides rounded in front, nearly straight and convergent behind, base slightly narrower than the apex; discal impression well marked, distinctly divided; apical angles obtuse but distinct, basal rounded. Elytra scarcely longer than wide, one third longer than the thorax, scarcely impressed along the suture at base. Abdomen as wide as the elytra at base, slightly wider to the apex of the fourth segment which is distinctly the widest part of the body. Length, 1.5 mm.; width, .35 mm. Two specimens.

This species may be distinguished from *T. volans* by its smaller size, stouter antennæ and wider abdomen. The thorax and elytra are narrower than in *T. incertus* Csy. or *delicatus* Csy. to which it is evidently related.

Bledius fracticornis Payk.

The specimens at hand agree exactly with European examples. *B. deceptivus* Fall is closely related to this species and perhaps synonymous with it. It has not been recorded heretofore from North America.

Stenus fulvoguttatus new species.

Form somewhat robust. Pubescence very short, distinctly visible only on the abdomen; color whitish. Head large, twice as wide as long; interocular surface strongly depressed, twice the width of the eye, median convexity broad but narrower than the lateral declivities; punctures of moderate size, separated by about one half their diameters; ocular lines meeting at three lengths in advance; antennæ longer than the width of the head, very slender; third joint nearly as long as the next two, four to seven decreasing very slowly in length, seven very elongate, eight one half longer than wide, nine as wide as long, shorter than the tenth and the eleventh which are elongate and subequal; club only moderately thick; palpi rufo-testaceous, last joint somewhat infusate at apex. Thorax widest at middle where it is three fourths the width of the head and about as wide as long; not very strongly arcuate in front, rather deeply sinuate posteriorly; the apex slightly narrower than the base; punctures coarse and very close, separated by less than half their diameters; median canaliculation distinct from base to apex, very strong in middle third where the disk is somewhat swollen either side. Elytra slightly narrower than the head at base, about as wide at the widest where they are as wide as long, suture a little longer than the thorax; sides arcuate and slightly divergent, apex moderately emarginate; punctures coarser than those on the thorax, polygonally crowded along the suture and apically; disk distinctly impressed on the suture at base and laterally; a small fulvous spot on the center of each just behind the middle. Abdomen narrower than the elytra at base, rather rapidly decreasing in width posteriorly, basal segments coarsely and closely punctate, fourth and fifth with the punctures much finer and sparser. Legs long and slender; femora pale testaceous at base, gradually darker apically; first joint of the posterior tarsi equal in length to the next three. Length, 4.5-5 mm.; width, 1 mm. ♂♀. Two specimens.

Male. Fourth ventral abdominal segment broadly and very feebly emarginate in median third, a small subcarinate tubercle at either end of the emargination. Fifth segment broadly subtriangularly emarginate in median third, emargination about four times as wide as deep; surface posterior to the emargination depressed for half the length of the segment bounded on either side by a carinate edge which is bluntly dentiform at the posterior extremity. Sixth segment with a deep subtriangular emargination as wide as deep and about one fourth the width of the segment and half its length. Seventh segment truncate at apex with an acute tooth at either side.

Female. Ventral segments unmodified.

This species is easily distinguished from the others of the group by the form of the thoracic canaliculation. From *S. semicolon* Lec., which it most closely resembles, it may be also distinguished by its larger size and much longer and more slender antennæ. The thoracic canaliculation is like that of the palæarctic *S. bimaculatus* Gyll., but

the head in the latter species is smaller, less transverse and the median interocular convexity much broader.

Stenus edax new species.

Form slightly robust. Pubescence short cinereous, conspicuous only on the abdomen. Head moderate in size, twice as wide as long; interocular surface two and two thirds times the width of an eye; ocular lines meeting at about one length in advance, sulcations distinct, the intermediate convexity narrower than the lateral portions, evenly convex; punctures moderately coarse, evenly, closely distributed, somewhat polygonal, a small smooth spot at the anterior end of the convexity; antennæ short not as long as the width of the head, black throughout, the club composed of five joints, the ninth narrower than the tenth which is as long as the last, the eighth large and distinctly transverse, the seventh slightly elongate and much thickened at apex; the funicular joints short, three to six decreasing rapidly in length, three scarcely shorter than the next two. Palpi rather short, entirely black. Thorax widest slightly before the middle where it is very slightly longer than wide and about four fifths the width of the head; disk somewhat flattened and the sides compressed making a rather vague longitudinal ridge either side, intervening surface anteriorly and posteriorly very slightly concave, median canaliculation very fine, scarcely impressed, extending from base to apical fifth; punctures close, coarse, even throughout, a more or less distinct whorl on the middle of the disk. Elytra at base just perceptibly wider than the head, conjointly as wide as long, the sides very slightly divergent and arcuate, the humeri very prominent, the suture about a fifth longer than the thorax, the surface somewhat undulated, the punctures very close and strongly canaliculated, isolated punctures not discernible; whorl entirely behind the middle. Abdomen slightly narrower than the elytra at base, gradually and rapidly decreasing in width posteriorly, evenly, rather coarsely and closely punctate throughout, punctures slightly finer and sparser on the fifth segment. Transverse carinæ tricusped, the middle cusp long, subcarinate. Legs entirely black; fourth tarsal joint simple, first joint of the posterior tarsi as long as the next three, as long as the fifth. Length, 3.7 mm.; width, 1 mm. ♀. One specimen.

Male. Unknown.

Female. Sixth ventral segment strongly rounded at apex.

This species seems distinct from *S. laccophilus* Csy. by its antennal structure, general proportions and rapidly narrowed abdomen.

Stenus perexilis new species.

Form very slender and parallel. Pubescence fine, short, cinereous, longer and denser on the abdomen though not very conspicuous. Head large, twice as wide as long, interocular surface slightly more than twice the width of the eye, ocular lines meeting at two lengths in advance; sulcations very feeble, the

median convexity not at all evident; punctures moderate in size, evenly distributed, separated by about half their diameters, interspaces feebly shining; antennæ long and slender, very distinctly longer than the width of the head; black; joints three to six decreasing very slowly in length, three but little longer than four; seventh elongate, enlarged apically, eighth globular, not wider; club distinct but not strong. Thorax widest at apical third where it is three fourths the width of the head and one third longer than wide; sides feebly areolate and convergent anteriorly, slightly more convergent and feebly sinuate posteriorly; apex arcuate, slightly wider than the base which is less distinctly arcuate; surface even, feebly shining, punctures of moderate size, very dense, a fine and rather faint median canaliculation extending from the base to a little before the middle. Elytra conjointly one fourth longer than wide, widest at the middle where it is exactly the width of the head; apex feebly emarginate, as wide as the base, sides feebly arcuate, suture one sixth longer than the thorax; punctures larger than those of the thorax, very dense and canaliculated, without whorls. Abdomen slightly narrower than the elytra at base, scarcely perceptibly narrower to the apex of the fifth segment; transverse carinæ four cusped, punctures finer than those of the thorax, rather dense, but slightly less so on the fifth segment. Legs black, fourth joint of the tarsi simple, first joint of the posterior tarsi not as long as the next two, shorter than the fifth. Length 3.25 mm.; width, .65 mm. One specimen.

Female. Unknown.

This species is related to *S. colonus* Er. It is more slender and the head is larger. The thoracic canaliculation places it in the preceding group of Casey's synopsis with those having four cusped abdominal carinæ. It would be distinguished from *militaris* by its elongate thorax and form.

Scopæus quadriceps Ntm.

Florida specimens answering to the description of *S. macilentus* Csy. were found in some material recently identified by the author for the American Museum of Natural History. The species is quite distinct from the above.

Pelurga luridipennis Mann.

A specimen in the material at hand is practically indistinguishable from a European example of the above species except by its small size—2 mm. It is somewhat immature and is possibly merely a dwarfed form. Ganglbauer states that the species is found throughout Europe and on the island of Madeira so that its presence in North America would not be surprising.

Daya (Phasmota) ingratala Csy.

This species was described from Mississippi. The specimen at hand agrees so perfectly with the description there seems no possibility of doubting the identification though its presence in New York is somewhat surprising.

Metaxya (Hygræcia) magniceps Sahl.

A large series in the material at hand agrees very closely with Ganglbauer's description of the above species. Comparison has also been made with a specimen of the closely allied European species (*H. debilis* Er. which differs by its pale antennæ. (*H. magniceps* is known from Finland and Germany.

Oxypoda (Demosoma) schaefferi new species.

Form slightly robust and distinctly fusoid, moderately convex, feebly shining; color black, thorax, elytra, legs and antennæ piceous, the basal joints of the antennæ not paler; tarsi somewhat paler. Head, thorax and elytra strongly alutaceous; punctures fine, shallow, umbilicate on the thorax, asperulate on the elytra, separated by twice their diameters; abdomen imbricate-reticulate, punctures asperate, sparser on the fifth segment; pubescence somewhat fine, equally dense throughout. Head transverse, rounded, slightly more than one half the width of the thorax; eyes scarcely prominent, rather large, at slightly less than their own diameters from the base; the tempora slightly divergent, infralateral carinæ very strong, entire; antennæ about reaching the base of the thorax, somewhat stout but not strongly incrassate, second joint slightly longer than the first, distinctly longer than the third, fourth slightly transverse, outer joints very gradually larger and more transverse, tenth three fifths wider than long, terminal joint obtusely pointed at apex, as long as the two preceding. Thorax scarcely one half wider than long, widest slightly behind the middle, sides strongly convergent and nearly straight anteriorly, feebly arcuate and subparallel posteriorly; base rounded, posterior angles completely rounded, disk indistinctly biimpressed at base. Elytra scarcely as wide as the thorax at base, distinctly wider at apex, sides straight and distinctly divergent, conjointly about one fourth wider than long, suture slightly longer than the thorax, sinuses rather strong. Abdomen slightly narrower than the elytra at base, feebly narrowed posteriorly (excluding the margins). Basal joint of the posterior tarsi nearly as long as the next three combined. Length 1.75 mm.; width, .75 mm. Two specimens.

This species is very close to the European *O. (Demosoma) rugicollis* Kr. The thorax is slightly more shining, the sides in front straighter, the elytra are longer and the legs and antennæ are dark.

It seems to be different from the species described by Casey. *O. vctula* from New Jersey probably belongs to a different subgenus.

Typophorus canellus Fabr., *scutellaris* new variety.

Black, head rufous with the occiput and a large spot on the front black; legs with the tibiae and tarsi rufous; narrow anterior margin of the thorax, a large elongate scutellar spot and the narrow apical margin of the elytra rufous. One specimen.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF FEBRUARY 17.

A regular meeting of the New York Entomological Society was held at 8 P.M. in the American Museum of Natural History, Vice-president John D. Sherman, Jr., in the chair, with nineteen members present, and President L. B. Woodruff later in the evening. One visitor, Mr. Emerson, of British Guiana, was also present.

Mr. Dickerson read a paper on "Miscellaneous Insects of the Evening Primrose" which will be printed later.

On motion by Dr. Lutz it was voted to publish plates for this paper at the expense of the Society.

Mr. Nicolay read a paper on "The Species of *Taphrocerus* and *Pachyscelus*," exhibiting his collection and that of Mr. Leng. He also called attention to an entomological illustration in "Ladies' Home Journal."

Mr. Sherman spoke, in connection with popular entomology, of the product of the Savage Northrup Animated Toy Co., imitating beetles.

Dr. Bequaert read a paper, "Some Remarks on North-American Conopidae," reviewing the classification, distribution, and life habits, calling attention especially to the lack of definite knowledge of the habits of *Stylogaster*.

Mr. Davis spoke of the contents of a red-eyed vireo's nest found February 14, where, with two grains of corn beneath the old leaves, reposed *Euschistus variolarius*.

MEETING OF MARCH 2.

A regular meeting of the New York Entomological Society was held at 8 P.M., on March 2, 1920, in the American Museum of Natural History President L. B. Woodruff in the chair, with twenty-six members and four visitors present.

Mr. Davis donated \$100.00 to the Society's fund, which amount on motion by Dr. Lutz was added to the Permanent Fund, with a vote of thanks to Mr. Davis.

Mr. E. A. Smith, 2 Arden St., New York City, was nominated by Mr. Watson for active membership.

Dr. Lutz spoke on "A Collecting Trip in Colorado," illustrating his remarks with a topographic sketch of the State and with many photographs shown on the screen by the projectiscope. He pointed out that the environmental factor was often overlooked in distribution data; and that his object had in part been to correct this for Colorado, a State in which, from its high mountains, Boreal and Transition zones occurred interrupted by four Sonoran areas as shown in Biological Survey of Colorado by Merritt Cary (No. American Fauna No. 33, U. S. Dept. Agl. Washington, 1911).

In carrying out this object, between June 3rd and August 20th, 29 different stations for collecting were established, including Lamar, Springfield, Regnier, Trinidad, Walsenburg, Alamosa, Bondad, Mesa Verde, Ridgeway, Grand Junction, Denver and Wray in the Sonoran; Monte Vista, Durango, Mancos, Rifle, Meeker, Glenwood Springs and Boulder in more or less Transition areas; South Fork, Pagosa Springs in more markedly Transition and Continental Divide, Electra Lake, Telluride, Ouray, Aspen, Tennessee Pass, Leadville and Ward in the more elevated Canadian and Hudsonian zones. The elevation at which the cooler zones occur are greater on the southwestern slopes than on the northeastern, so that the Transition begins at about 5,600 feet in one case, but not until 7,800 feet is reached in the other.

Dr. Lutz traced the distribution of certain species of *Bombus* in particular and showed specimens of the flowers and trees as well as the insects, closing by pointing out that though 500,000 specimens with ecological data had been gathered in the last ten years, they were only samples from selected places; and every group worked up by members become stones in the bridge from hazy notions to more perfect knowledge of distribution, the Museum was trying to build.

Mr. Shoemaker exhibited "Miscellaneous Beetles taken last Summer" principally at Washington, D. C., and on Slide Mountain in the Catskill Mountains, the latter including a number of northern forms. Mr. Hallinan spoke of the Lepidoptera of Panama, particularly in reference to migration.

Dr. Bequaert commended the minute details accumulated on the migration of swarms of tropical butterflies.

Mr. Angell spoke of winter collecting of longhorns on hickory fire wood.

JOURNAL
OF THE
New York Entomological Society.

VOL. XXVIII. SEPTEMBER-DECEMBER, 1920. NOS. 3 AND 4.

THE BEETLES OF THE FAMILY CUPEDIDÆ OF
AMERICA, NORTH OF MEXICO.

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The members of the family Cupedidæ are undoubtedly among the most remarkable and rare of the Coleoptera known to occur in America, north of Mexico. They are especially remarkable because of their peculiar tuberculate character and the grotesque sculpturing of their bodies. Two taxonomic papers dealing with the American species of the family have been published:

LeConte—"On the Cupesidæ of North America," in Trans. Amer. Entom. Soc., V, 1874, pp. 87-88.

Casey—"Synopsis of the genus *Cupes*" in Ann. N. Y. Acad. Sci., IX, 1897, pp. 637-638.

Five species of the family Cupedidæ have been described from our territory, four of which have been held to be distinct while the fifth, *Cupes oculatus* Casey (13), has been reduced to the rank of a variety by Blatchley (24). After carefully reviewing the facts, however, the writers believe that *oculatus* has good specific characters and it is here considered as a distinct species, the reasons being enumerated hereafter.

Three of the American species have never been figured. This

need the writers have herewith endeavored to supply at the same time including keys and the original descriptions of the genera and species together with some notes on the distribution.

The relationship of the Cupedidæ to the other groups of Coleoptera has long been disputed among systematists and the position of the family is still uncertain.

LeConte and Horn (12) have been followed by most American students, including Blatchley (24), in placing the family in the Serri-cornia. It has remained for Brues and Melander (28) to bring to the attention of the American student the newer and more correct viewpoint of the European Coleopterists in the relationships of groups, and apparently they have followed Ganglbauer (18) more closely.

Sharp (22) has placed the Cupedidæ in the Polymorpha associated with the Cucujidæ but, as Gahan (26) has pointed out, his arrangement of the Coleoptera was evidently not formulated with any particular regard to the phylogeny of the groups.

Doubtless the most comprehensive treatise on the subject has been published by Gahan (26) in which he treats of the results of the studies of Ganglbauer (18), Lameere (14 and 19), and Kolbe (16 and 20), in their attempts to classify the Coleoptera. He shows that the more recent work of these systematists has resulted in the placing of the Cupedidæ, as follows:

Ganglbauer (18) placed the Cupedidæ in the Adephaga, believing them to be a more modified family of that group;

Lameere (19) placed the Cupedidæ in the Cupediformia of the Adephaga, believing them to be Adephaga of the most primitive type;

Kolbe (16) placed the Cupedidæ in the Adephaga, but later (20) removed the family to the Heterophaga or Polyphaga, erecting the division Symphyogastra for their reception.

Gahan (26) does not clearly commit himself as to where he believes the family should be placed, but a careful study of his work shows that he undoubtedly would place the family in the Adephaga and would probably follow Ganglbauer (18) most closely.

Kolbe (Gahan (26), p. 124) has shown that the wing venation of the Cupedidæ is nearer to the original type than all other Coleoptera.

Ganglbauer (18) for this reason, and because the sternites and pleuræ of the second abdominal segment are completely fused with those of the third, considers the group a more modified family of the Adephaga. Gahan (25 and 26, p. 166) gives as an additional reason in support of this disposition of the family that there is a suture on each side of the prothorax between the notum and the pleuræ, a condition met with only in the Adephaga.

Gahan (26, p. 247) has shown that Lameere was mistaken in believing that the second and third abdominal segments are entirely separate which was his reason for considering the family the most primitive of the Adephaga.

Because of the complete fusion of the sternites and pleuræ of the second and third abdominal segments, Kolbe (20) removed the family from the Adephaga and placed it in the Polyphaga but Gahan (25 and 26, p. 166) has shown an additional reason, as stated previously, why this should not be done.

With the description and figuring of the larvæ and pupæ of *Cupes concolor* Westw., Snyder (27), the subject is anything but cleared and Gahan's (26) opinion will perhaps be reversed.

Lameere (Gahan (26), p. 166) believed that the larvæ live in wood and are of the eruciform type. Snyder (27) has shown that the larvæ are of the eruciform type and do live in wood; in fact, they greatly depart from the campodeiform type, and he states that the legs are five-segmented with a single claw, approaching somewhat larvæ of the Lymexilonidæ in appearance. These characters are, indeed, widely different from the campodeiform larvæ with six-segmented legs and tarsi with two claws that are found in the Adephaga, although Gahan has shown here that one exception is now known in Adephagan larvæ in the family Paussidæ which Dr. Böving describes as having only five segments in each leg.

We must, if we are to admit that the two suborders, Adephaga and Polyphaga, are the true major divisions of the Coleoptera, weigh these points very carefully in deciding the position that the Cupedidæ should hold. The characters may be summed up as follows:

CUPEDIDÆ.

ADEPHAGA.

Wing venation of the first type (Gahan, 26, p. 124). A suture on each side of the prothorax between the notum and pleuræ (Gahan, 26, p. 166).

POLYPHAGA.

Sternites and pleuræ of the second abdominal segment completely fused with the third (Gahan, 26, p. 247). Habits of the larvæ. Larvæ cruciform, widely departing from the campodeiform type. Larvæ with legs of five segments—tarsi with a single claw (Snyder, 27).

Shall we, therefore, in view of these characters, consider the Cupedidæ—

1. As a modified family of the Adephaga, as Ganglbauer and Gahan contend?
2. As a distinct subdivision of the Polyphaga, nearly approaching the Adephaga as Kolbe considered them, or
3. As holding a position between the Adephaga and the Polyphaga, having important characters of each of these suborders and indicating a more direct descent from the original Coleopteron? The wing venation would seem to indicate that this might be true.

The writers are more inclined to agree with Kolbe (20) in placing this family in the Polyphaga, for if we are correct in believing that only beetles having the campodeiform type of larva should be placed in the Adephaga, then the Cupedidæ are widely different, notwithstanding the wing venation and the suture on each side of the prothorax between the notum and pleuræ.

To be sure, Dr. Böving's discovery of an exception to the six-segmented leg of the Adephaga in the Paussidæ would tend to show that the Cupedidæ might not be excluded from that group by that reason alone.

If the Coleoptera are really to be arranged with regard to the true phylogeny of groups much and exhaustive study will have to be made on the ontogeny of the species. This knowledge at present is so manifestly inadequate in most families that a grouping in accordance with true racial relationships is usually impossible. Notwithstanding, it is the only permanent basis and the one which should be kept constantly in mind. Therefore, until our information on the

life-history and the bionomics of the species herein concerned is more ample it seems correct to place the Cupedidæ in the Polyphaga, in the position Kolbe has suggested for its retention.

IMMATURE STAGES.

Snyder (27) has recently published descriptions and figures of the larvæ and pupæ of *Cupes concolor* and has thereby filled a long felt need.

The larvæ were found excavating longitudinal burrows in solid, but decaying chestnut (telegraph pole) and oak (trestle timbers). The following is Mr. Snyder's characterization of the larvæ and pupæ of *Cupes concolor* Westw.

"The larva is 23.5 mm. in length, white, elongate and subcylindrical. Body gradually broadening from the sixth to the eighth abdominal segment, ninth abdominal segment conical, with numerous long hairs on sides, armed with more heavily chitinized sharp tubercles, being produced to a narrow, heavily chitinized cylindrical anal process; anal process widening at apex, tip concave. Pleural ridge on all abdominal segments. Prothorax prominent, approaching the characteristic dilation of *Eupsalis* and *Lymexilonid* larvæ, broader than head and other thoracic segments. Prosternum broad, flat, armed with numerous chitinized asperities. Legs 5-jointed, excluding claw; first joint large, flattened, fleshy lobe. Labium with hairs on anterior portion. Antennæ 4-jointed. Maxillæ with all three parts distinct; lacinia thick and fleshy, with long hairs pointing inward on anterior portion, palpi 3-jointed; galea 2-jointed. Labium black, chitinous, chisel-edged emarginate, with 2-jointed palpi. Mandible black, chitinous with large, blunt basal tooth and 3 other teeth.

"Pupa is 11.5 mm. in length, white, body somewhat flattened, abdominal segments gradually broadening; anal segment widest, conical; genitalia with 2 lateral, curved, chitinous hooks, pointing anteriorly. Dorsal carina running the whole length of the body, becoming more distinct toward the end of the abdomen. Antennæ lying ventrally, overlapping the elytra. Head bent ventrally at right angles to prothorax. First pair of legs lying between other pairs."

CHARACTERIZATION OF THE FAMILY.

Cupesidæ—Lac. (7); LeConte and Horn (12); Blatch. (24).

Cupedidæ—Alluaud (15); Peyerimhoff (17 and 21); Gahan (26).

Catalogues—Gem. & Har. (9); Junk (23).

The following characterization is from LeConte and Horn (12) and Blatchley (24).

"Antennæ 11-jointed, filiform, rigid, inserted rather close together upon the front; the head tuberculate, stretched out forward and suddenly constricted behind and attached to the thorax by a distinct neck; thorax small, quadrate, the side margins well defined; prosternum well defined with a slight point behind fitting into the mesosternum; elytra entire, with rows of large punctures and intermediate ribs; front coxæ small, not prominent, their cavities transverse, open behind; mesosternum with the side pieces excavated for the middle legs; hind coxæ transverse, flat, sulcate behind, receiving the thighs in repose; abdomen with five free ventral segments; legs slender, contractile; tibiæ without terminal spurs, tarsi 5-jointed, spongy beneath, their claws simple."

Gahan (26) has shown that the family should be further characterized, as follows:

A suture on each side of the prothorax between notum and the pleuræ; sternites and pleuræ of the second abdominal segment completely fused with the third; wing venation of a more or less completely developed and unmodified state, the costa, subcosta, radius, media, cubitus and analis present and joined together by a greater number of transverse veins than are known to occur elsewhere in the Coleoptera. The anterior branch of the media is a long vein running uninterruptedly almost from the base to the margin and is joined by means of two transverse veins with the media, and by two with the posterior branch of the radius, which, itself, is joined to the radius by two transverse veins. There are, also, two transverse veins between the cubitus and media, and two between the cubitus and analis.

KEY TO THE GENERA OF N. A. CUPEDIDÆ.

Antennæ less approximate at base, shorter and stouter, scarcely half as long as the body; eyes small; gular sutures distant, curved slightly outwards; double row of spicula present only on posterior half of elytral margin.

Priacma Lec.

Antennæ more approximate at base, longer, less stout, exceeding half length of the body; eyes larger; gular sutures more approximate, not curved outwards, parallel or converging behind; spicula, if present, occupying the full length of the elytral margins.....*Cupes* Fabr.

KEY TO THE SPECIES OF CUPES.

The following key is from Casey (13).

Supra-antennal tumid surface rounded and convex; antennæ shorter; tempora more developed behind the eyes, which are usually smaller.

Body black, the head pale and ochreous-yellow in color; punctures of the elytral series very large, deep and quadrate.....*capitatus* Fabr.

Body ochreous, the elytra variegated with confused patches of dark piceous-brown; punctures of the elytral series much smaller.

lobiceps Lec.

Supra-antennal tumidity obliquely angulate, the antennæ more elongate; tempora short, the eyes very large; body ochreous in color, the elytra variegated with sublongitudinal patches of a darker brown.

Elytral series composed of large approximate quadrate punctures.

concolor Westw.

Elytral series composed of narrow, elongate punctures; antennæ less elongate *oculatus* Casey.

Priacma Lec.

Dr. LeConte (10) characterized this genus as follows:

"Since I have seen the Australian genus *Omma*, I recognize in *Cupes serrata* (Lec. Proc. Acad. Nat. Sc. Phila. 1861, p. 351) a distinct genus, intermediate between that and *Cupes*. From the latter it differs by the antennæ less approximate at base, shorter and stouter, scarcely half as long as the body, with the joints triangular and narrower at the base, the first as long as but stouter than the 3d. The eyes are much smaller, though nearly smooth; the under surface of the head is quite different; gular sutures distant, curved slightly outwards, gular angles not porrected, but broad and truncate; mentum more prominent, maxillæ more exposed, maxillary palpi longer, last joint elongate, cylindrical, truncate. These differences were partly indicated by me in the remarks appended to the description of the species. The color is mottled gray; head with four subacute tubercles, but not lobed, front concave. Prothorax nearly square, with front angles prominent; elytra more convex, alternate interspaces feebly convex and a little uneven; side margins strongly toothed towards the tip."

Priacma serrata Lec. (8).

"Reddish brown, marked irregularly with black variegated with gray and black squamulæ; front concave; thorax transverse with parallel sides, anterior angles acute and divergent, apex towards the middle broadly and slightly projecting, closely punctuated, grooved, anteriorly and posteriorly transversely impressed; elytra cylindrical, serial foveæ quadrate and cancellate, sides towards the apex armed with acute spinulæ in two series; eyes small; antennæ shorter than half the length of the body, ringed with ash and black color. Length .43-.82."

"East of Fort Colville, at Sinyak water depot, and at Camp Kootenay, the variation in size of this remarkable species is very great. Besides the spicula on the lateral margin, and on the extreme inflexed margin of the elytra, a few are visible on the 7th interstitial line near the tip. The blackish markings are scattered along the interstitial line and a broad band behind the middle is also seen."

We were only able to see three specimens of this species in the LeConte collection, from Oregon. Occurs also in Br. Col. and Cal. (Leng.) Lengths 11.-19.5 and 22 mm.

Cupes Fabr.

Fabr. (1); Lac. (7).

The following is Fabricius' description of the genus.

"Palpi four, equal, last segment thicker, truncate; ligula short, membranaceous, bifid; antennæ cylindrical."

Cupes capitatus Fabr.

Fabr. (1); Coqueb. (2); Cast. (5); Baynes & Reed (11).

"Mouth with maxillæ and palpi; palpi four, equal, subfiliform, anterior 4-jointed, joints subequal; last thicker, truncate, attached to the back of maxilla; posterior 3-jointed, 2nd joint longer and attached to the base of the ligula; mandibles short, thick, bifid at the apex, outer division slender, filiform, inner broad, rounded; ligula short membranaceous, bifid, with divisions ovate, rounded, distant, antennæ cylindrical. Body elongate, smooth, emarginate, slender, black; head small, ovate, projecting, uneven, red; antennæ much longer than the thorax, approximate, cylindrical, first joint thicker, black, inserted between the eyes; eyes small, globose, prominent, marginal; thorax flat, short, transverse, unequal, black, with margins somewhat projecting, elytra rigid, fornicate, sulcate, ridges black, with raised punctures scabrous, lengthwise of abdomen; legs short, compressed, adapted to running, black; tarsi 4-jointed, reddish."

Specimens examined from "Middle States," "Gulf States," "Central Valley States," Ill., Mo., Md., and Mass. Occurs also in S. C., Va., Tenn. (Leng.) Varies from 7 mm. to 10.5 mm. in length.

Cupes lobiceps Lec. (10).

"Body elongate, slender, pale-gray, slightly mottled with darker; antennæ compressed serrate for the lower half, two thirds as long as the body; head deeply channelled and transversely impressed, thus dividing into two large posterior tubercles or lobes, and two smaller frontal ones; there is also a lateral lobe behind the eye, separated by a deep groove; eyes large; prothorax

suddenly narrowed in front, with the sides strongly elongated and a large median elevation which has a deep rhomboïdal excavation; elytra with rows of moderate sized quadrate punctures, 3d interspace more convex, 5th, 6th and 7th forming an obtuse costa, 2d and 4th flat. Length .45 inch or 11 mm.

"San Diego, Cal. A specimen kindly given to me by Mr. Ulke. This species resembles the figure of *C. latreillei* Solier (Lacordaire, Gen. Col. Atlas, pl. 47, fig. 2) in the form of the antennæ. It differs conspicuously from our other species by the large posterior lobes of the head and the different sculpture of the prothorax."

Specimens seen from So. California. Occurs also in Ariz. (Leng.) Length from 8 mm. to 9.4 mm.

Cupes concolor Westwood.

Westwood (3); Blatchley (24); Snyder (27).

cinera Say.

Say (4); Cast. (5).

trilineata Melsh.

Melsh. (6).

"Elongate, slender, subdepressed. Pale brownish or ash gray, densely covered with small scales; elytra with darker oblong dashes or blotches, which form three indistinct undulated bands. Antennæ nearly as long as the body. Head with four feebly separated tubercles, with a narrow impressed line between them. Thorax wider than long, about half the width of elytra; disk with a median longitudinal carina and a deep impression each side; side margins abbreviated near the front and hind angles. Elytra with rows of large quadrate punctures; intervals convex, the alternate ones higher. Length 7-11 mm."

Specimens examined from "Middle States," "Central Valley," Indiana, Mass., and N. H. Occurs also in Ga., Fla., Md., Mich., Pa., N. Y. (Leng.)

Cupes oculatus Casey.

Casey (13) Blatchley (24).

"Form nearly as in *concolor* but less elongate, pale, yellow-brown, with indefinite sublineate spots of dark brown on the elytra; integuments throughout densely scaly. Head scarcely wider than the prothorax; sides above near the eyes longitudinally tumid, the elevation divided transversely at the anterior limit of the very large convex eyes; median line fine, coarse anteriorly; tempora very short. Prothorax fully $\frac{3}{4}$ wider than long, rectangular and nearly straight in basal $\frac{3}{4}$, becoming feebly convergent and arcuate towards base; disk elevated along the middle, with a fine median line, broadly reflexed at the base, also deeply concave at each side of the middle. Scutellum well devel-

oped, rounded. Elytra $2\frac{3}{4}$ to nearly 3 times as long as wide, parallel and straight at the sides, gradually narrowed at apex, distinctly wider than the head; ridges feeble, the second and third alone distinct. Under surface densely scaly. Length 8.5 to 9.7 mm. width 2.0 to 2.2 mm." Recorded from Indiana. Occurs also in Md., Kans., Fla., Texas, Mich., and N. Y. (Leng.)

The writers have been unable to see the type of *oculatus*, and it is doubtful if Blatchley (24) had seen a specimen when he considered it a variety. It seems to be quite distinct and as an amplification to the original description the following is quoted from a letter from Col. Casey and a sketch showing the difference in elytral sculpture is included with the figures.

"In *concolor* the body is more elongate and slightly larger than in *oculatus* and the antennæ are longer and more slender. In *oculatus* the head is transversely sulcate between the eyes, there being no vestige of the sulcus in *concolor*: the head and prothorax are very similar in habitus in the two but in *concolor* the sides of the latter are deplanate and not sharply reflexed as they are in *oculatus* and the median ridge of *concolor* is broader.

"The most striking difference is, however, in the sculpture of the elytra. In *concolor* the punctures of the double series are coarser, more close set and quadrate, while in *oculatus* they are elongate, relatively narrower, more distinctly so than shown in the drawing sent herewith, and the series in *concolor* are very much more approximate than in *oculatus*.

"The coloration of the two is nearly alike, being pale ochreous-gray, feebly mottled with darker. In my opinion there is no possibility of these not being two distinct species in the material at hand, the only point being as to whether or not Westwood's species is correctly identified. As my identification coincides completely with that of LeConte, I, however, have no doubt on this score."

Following his description of *Cupes serrata* LeConte (8) added a consideration of the species known at that time, all confined to the genus *Cupes*, in which he pointed out the most important character differences of the species. He said, "It will probably be found on dissection that the characters separating our three species of *Cupes* will warrant them in being considered as belonging to distinct genera." Some time later LeConte (10) did separate the most widely differing species, *serrata*, erecting the genus *Priacma* for its reception.

Four species must still be retained in *Cupes* although certain characters, most noticeably the antennæ, eyes, and tuberculate head, are widely different, but until one finds fresh preserved material for exhaustive study LeConte's conception of the family as indicated heretofore must stand.

The writers wish at this time to thank Mr. Nathan Banks for his kindness in allowing examination and study of the material in the Museum of Comparative Zoology, especially the LeConte collection, which is particularly rich in the Cupedidæ. They desire also to thank Mr. C. W. Johnson for permission to examine the specimens in the collection of the Boston Society of Natural History. To Mr. C. W. Leng and to Col. Casey thanks are also due for notes and suggestions.

Drawings from *Priacma serrata* and *Cupes lobiceps* are from type; *Cupes capitatus* and *Cupes concolor* from typical specimens.

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EXPLANATION OF PLATE X.

- Fig. 1.—*Cupes lobiceps* Lec., dorsal aspect.
 Fig. 2.—*Cupes concolor* Westw., dorsal aspect.
 Fig. 3.—*Priacma serrata* Lec., dorsal aspect.
 Fig. 4.—*Cupes capitatus* Fabr., dorsal aspect.
 Fig. 5.—*Cupes capitatus* Fabr., lateral view of head.
 Fig. 6.—*Cupes capitatus* Fabr., ventral aspect.
 Fig. 7.—(A) *Cupes concolor* Westw.—Detail of elytral sculpture. (B) *Cupes oculatus* Casey—Detail of elytral sculpture (after sketch by Casey).

NEW SPECIES OF SERICA (SCARABÆIDÆ). III.

By R. W. DAWSON,

LINCOLN, NEBRASKA.

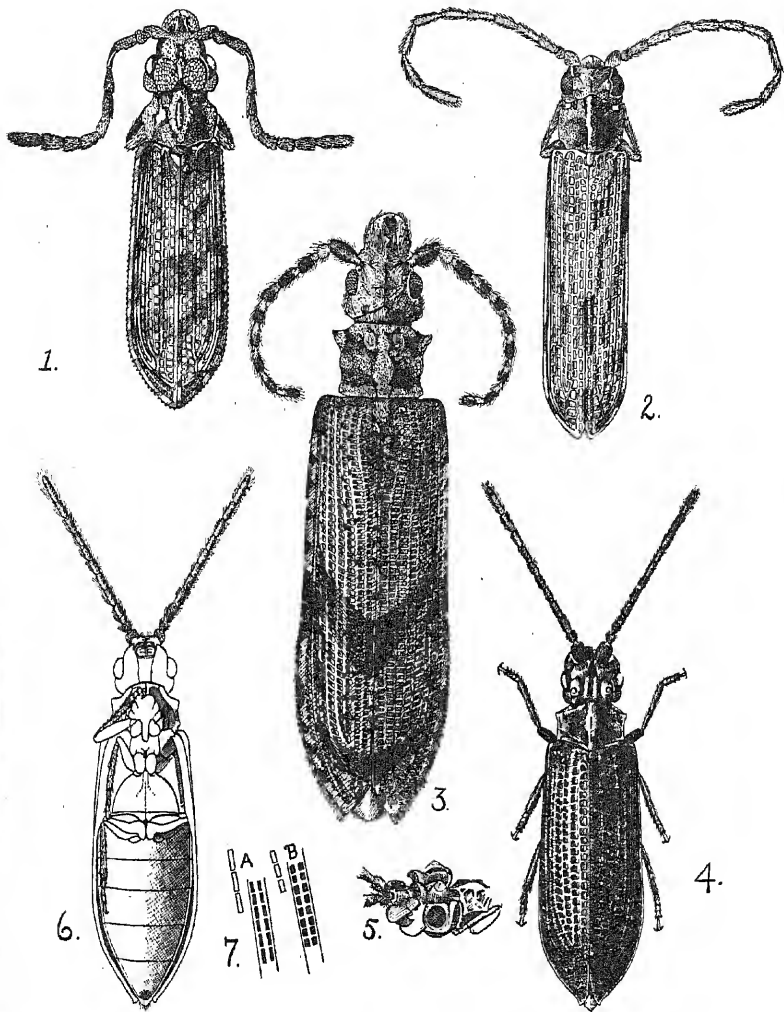
Serica loxia new species.

♂. Length 7 mm. Color auburn, surface bare, polished and shining.

Clypeus nearly level with the front, feebly impressed below the suture and before the reflexed margins, broadly and feebly tumid just below the middle; anterior margin abruptly, moderately elevated, nearly straight viewed vertically, lateral margins distinctly reflexed, separated from the anterior margin by a sharp, rather deep incisure; punctures moderately strong and closely placed, separated by about half their own diameters; clypeal suture distinct, very obtusely angled at the middle. Front less closely and regularly punctured, the punctures nearly or quite wanting on the occipital area, separated by one half to two times their own diameters on the lower portion of the sclerite. Eyes and antennal club of moderate size. Measurements of head (in tenths of a millimeter) as follows: Diameter of head through eyes, 20; distance between the inner eye margins, 12; length of head on median line, 16; extreme width of clypeus in front of incisure, 9; antennal club, 8; dorso-ventral diameter of eye, 5.

Pronotum relatively broad, short, and flat, the sides nearly straight, and only moderately convergent to the anterior angles; surface rather strongly, closely and evenly punctured, the punctures separated by one to two times their own diameters. Measurements of pronotum as follows: Width through posterior angles, 31; width through anterior angles, 21; length of median line, 17. Scutellum with a few strong punctures, closer toward the sides; length, 6.5; width, 6.5.

Elytra with the usual, moderately well developed striæ, each stria with three confused rows of closely placed punctures. Length of elytra, 54; greatest width, 40.



(CUPEDIDÆ.)

Elytra with the usual, moderately well developed striae, each stria with three confused rows of closely placed punctures. Length of elytra, 54; greatest width, 40.

Posterior coxal plates shining, coarsely and closely punctured, the punctures separated by about their own diameters. Metasternum nearly as strongly and closely punctured as the coxal plates. Hind femora with a number of scattered, coarse punctures, tending to condense into a line about two fifths of the way from the posterior edge. Abdominal sternites less shining, with the punctures about half to two thirds the size of those on the coxal plates, and separated by about twice their own diameter. The usual single rows of setigerous punctures present, but not conspicuous.

Length of genital armature of male, 2.4 mm.; its most striking character the sudden flexure of the tip of the left clasper across the right clasper. (Plate XI.)

♀. Differs from the male by the usual secondary sexual characters; smaller eyes, smaller antennae (club 5.6 instead of 8), less strongly notched clypeus, less emarginate last ventral sclerite, and more convex under-line of abdomen.

Type: ♂. Millers, Indiana, July 19, 1916.

Allotype: ♀. Millers, Indiana, July 19, 1916.

Paratypes: 6 ♂.

Indiana: Lawrence County, 1 ♂; Lake County, 2 ♂.

Wisconsin: Bayfield, 1 ♂.

North Carolina: Highlands, 1 ♂.

Georgia: Clayton, 1 ♂.

The scarcity of specimens of *loxia* in collections, and the wide distribution shown by the few at hand would seem to indicate that it is one of the less common species.

Serica carolina new species.

Serica carolina Blanchard, M. S.

♂. Length 7.5-8 mm.; width, 4.5 mm. Color varying from Sanford's brown to chestnut; surface bare, polished and shining.

Clypeus continuous with the even convexity of the front; anterior margin moderately reflexed, nearly straight, lateral margins a little less prominent than the anterior margin and almost continuous with it; clypeal notch almost obsolete, being reduced to a mere angulation at the juncture of the lateral and anterior margins; punctures rather coarse and evenly placed, separated by about their own diameters; clypeal suture fine, but distinct. Front less closely and regularly punctured than the clypeus, punctures separated by one to three times their own diameters. Antennal club well developed, and eyes rather large. Measurements of the head as follows: Diameter of head through eyes, 23; distance between inner eye margins, 13; length of head on median line, 15; extreme width of clypeus in front of incisure, 10.6; antennal club, 8; dorso-ventral diameter of eye, 9.

Pronotum nearly one and two thirds times as wide as long, not very convex, sides nearly straight and but little convergent anteriorly, except just before the rather obtuse anterior angles where they are broadly rounded inwardly; punctures a little smaller than those of the clypeus, rather evenly and closely placed, being separated by one to two times their own diameters. Measurements of pronotum as following: Width through posterior angles, 35; width through anterior angles, 23; length on median line, 22. Scutellum medially with punctures separated by two to three diameters, but laterally by only half a diameter; length, 7.5; width, 7.5.

Elytra moderately striated, the striae not sharply limited and with three somewhat confused rows of moderate-sized punctures, which though closely placed show very little tendency to coalesce laterally. Length of elytra, 55; greatest width, 45.

Posterior coxal plates shining, coarsely and closely punctured, the punctures separated by about their own diameters. Elsewhere beneath, surface less shining and puncturation finer. Abdominal sternites with the usual single, transverse rows of setigerous punctures; setae, however, not conspicuous and tending to become obsolete medially.

Length of genital armature of male 2 mm.; recognizable at a glance from the armatures of all the other *vespertina* like *Sericas* known to the writer by the attenuated form of the stalk and claspers (Plate XII).

♀.—Differs from male by having the clypeal notch nearly or quite obliterated, the anterior and lateral reflexed margins of the clypeus being continuous; by having smaller eyes (dorso-ventral diameter of 8 instead of 10) and a shorter antennal club (6.3 instead of 8); also by the more convex underline of the abdomen and less emarginate terminal sternite.

Type: ♂. Southern Pines, North Carolina, December 31, 1915 (A. H. Manee).

Allotype: ♀. Southern Pines, North Carolina (A. H. Manee).

Paratypes: 14 ♂, 11 ♀.

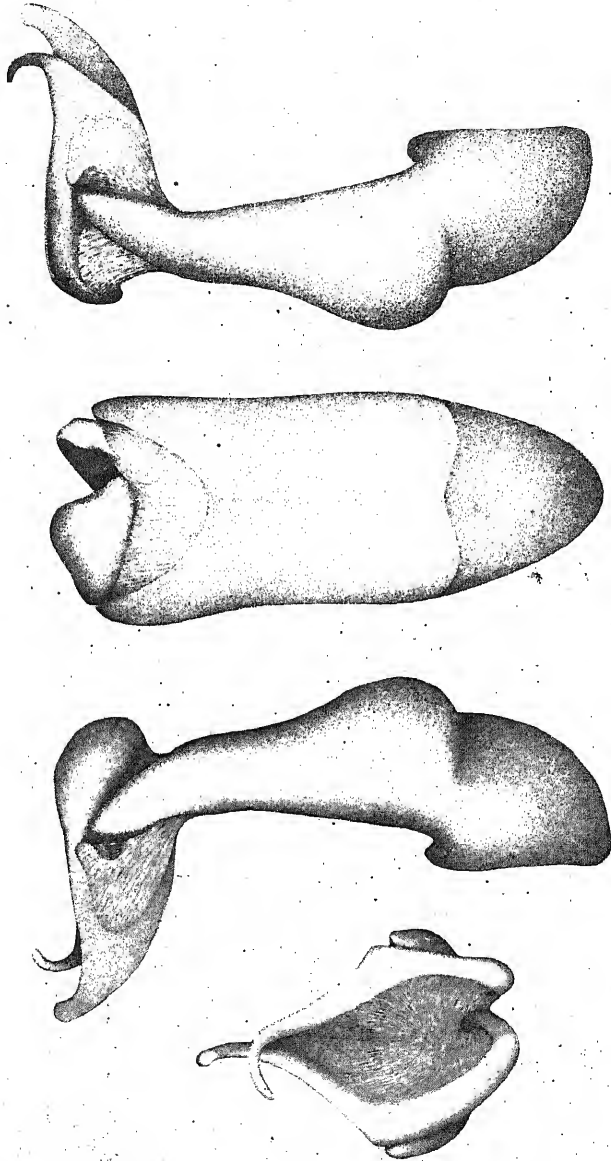
North Carolina: Southern Pines. 13 ♂, 10 ♀; Chapel Hill, 2 ♂.

In deference to the memory of the late Frederick Blanchard I have employed the name which he intended to use for this species. The specimens in Mr. Blanchard's collection as well as most of those in other collections were taken by Mr. A. H. Manee of Southern Pines, North Carolina, who has also used the manuscript name *carolina* in sending out his specimens.

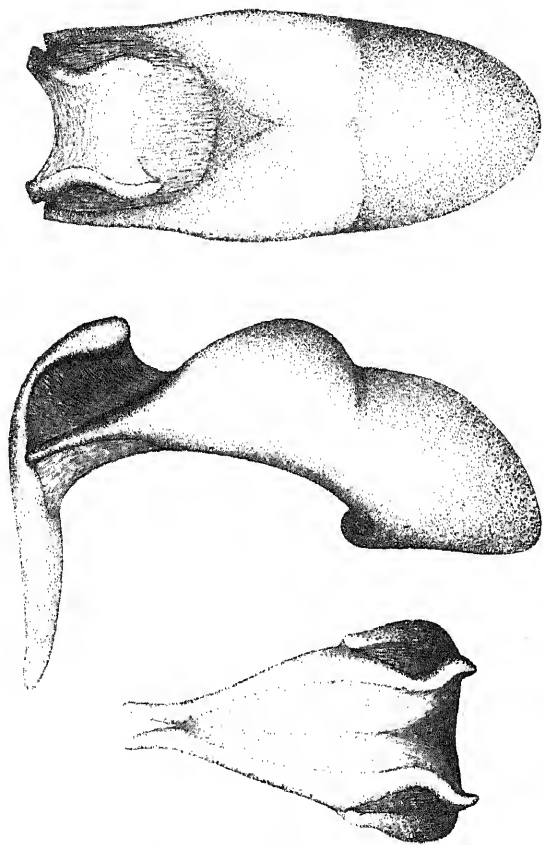
Serica perigonia new species.

♂.—Length, 8 mm.; width, 4.5 mm. Color auburn, surface opaque, lightly covered with a grayish bloom or pollen, and showing traces of a brilliant iridescence when viewed in shifting light with a lens.

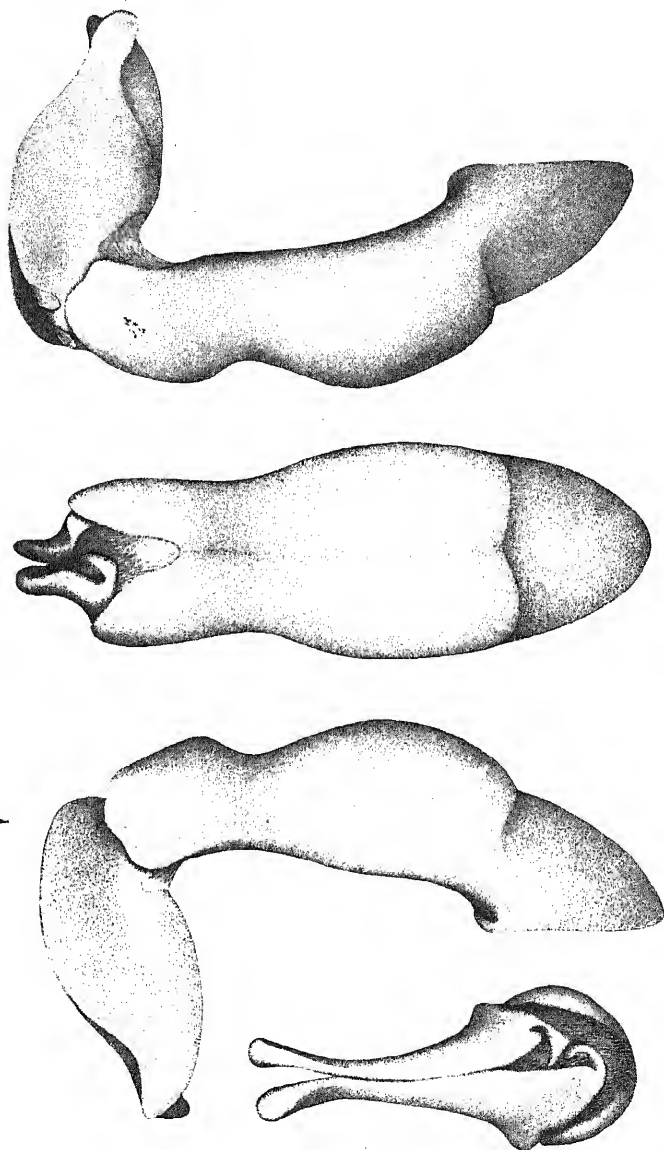
Clypeus with discal area rather densely covered with medium-sized punc-



(SERICA LOXIA.)



(SERICA CAROLINA.)



(SERICA PERIGONIA.)

tures, coalescent to separated by two thirds of their own diameters; a few coarser punctures anteriorly, at the edge of the less strongly and densely punctate submarginal impression. Clypeal margin moderately and rather suddenly reflexed, somewhat emphasized by the submarginal impression. Reflexed margin broadly and distinctly sinuate anteriorly; the usual lateral incisures entirely wanting. Front finely, sparsely and irregularly punctate, becoming impunctate toward the occiput; separated from the clypeus by a fine, almost evenly arcuate suture. Planes of front and clypeus more or less deflected to the suture, thus forming a diffused, transverse facial depression, usually less distinct medially but always clearly marked at the sides in front of the eyes. Antennal club small and short, about equalling the length of joints 2 to 6 inclusive. Eyes small. Measurements of head as follows: Diameter of head through eyes, 22; distance between inner eye margins, 16; length of head on median line, 20; extreme width of clypeus in front of the position where the incisure occurs in many species, 13; antennal club, 6; dorso-ventral diameter of eye, 7.

Pronotum rather strongly convex from side to side, the lateral margins evenly and distinctly arcuate, and the hind angles very obtusely and evenly rounded. Puncturation inconspicuous, rather fine and shallow, but closely and evenly distributed, the punctures separated on the average by about twice their own diameters. Sides of pronotum with a small, inconspicuous, though distinct, piceous spot at the middle near the margin. Measurements of pronotum as follows: Greatest width; a little in front of the very round posterior angles, 35; width through the anterior angles, 22; length on the median line, 19. Scutellum rather densely, but very finely and inconspicuously punctate; length, 9; width, 9.

Elytra feebly striate, the striae line-like, each bearing a single, somewhat irregular row of fine punctures. Intervals with a few small, scattered punctures, feebly convex, the second, fourth and sixth slightly wider than the others. Elytral punctures bearing inconspicuous, short, erect, yellow hairs. Length of elytra, 60; width, 45.

Metasternum and posterior coxal plates more strongly punctured than the upper surface, but punctures still relatively small, separated by one to three times their own diameters. Abdominal sternites with the usual, single, irregular rows of rather conspicuous, setigerous punctures, and at the sides with a few small hair-bearing punctures. Coxæ and femora of front and middle legs, and meso- and meta-sternum moderately clothed with erect, yellow hairs.

Length of genital armature of male (Plate XIII), 2.6 mm.

♀.—Differs from the male only in the slightly smaller antennæ (club 5 instead of 6 as in the male) and broader and less emarginate last abdominal sternite.

Type: ♂. Bellevue, Utah, 3,400 ft., June 21-23, 1919 (W. Knaus).

Allotype: ♀. Bellevue, Utah, 3,400 ft., June 21-23, 1919 (W. Knaus).

Paratypes: 15 ♂, 7 ♀.

Utah: Bellevue, 9 ♂, 4 ♀; Eureka, 1 ♂; Vineyard, 1 ♂, 1 ♀; Cedar City, Coal Creek Canyon, 6,250 ft., 1 ♂, 1 ♀; Stockton, 1 ♀.
California: La Crescenta, Los Angeles Co., 4 ♂.

FURTHER NOTES ON THE MEMBRACID GENUS OPHIDERMA FAIRM. (HEMIP.-HOMOP.).

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In the December, 1919, number of this JOURNAL the writer set forth the results of his study of the Membracid genus *Ophiderma*, but certain of his conclusions were perforce stated tentatively, owing to lack of positive evidence to substantiate them. That lack in some important instances has been supplied during the past season's collecting, and by the proof thus furnished it is found that the deductions therein arrived at chiefly by logical processes are correct.

One of them had to do with Gibson and Wells' *O. fraterna* and its probable status as the male of Goding's *O. flava*. That supposition is now established as a fact. During the month of June, at Litchfield, Conn., males of *fraterna* were frequently taken in association with females of *flava*, and in at least three instances they were taken in copulation; thus removing any possible doubt as to the identity of the former species. As suggested in the paper above referred to, the specific name *fraterna* Gib. & Wells must sink as a synonym of *flava* Godg., and these two very differently colored insects be brought together in our cabinets as the two sexes of the latter species.

My series of males of *flava* taken this past summer consists of fifteen specimens, ranging in date from June 22 to July 1, to wit: the three paired and *in copula* take on *Quercus rubra* (June 29 and 30), three others also on *Q. rubra*, seven on *Q. coccinea* and two on *Q. alba*. The females of this species taken this season were found on the three foregoing species of oak in about the same proportions respectively, but specimens of this sex continued to be taken for more than a month after the males had disappeared, a phenomenon which seems to be usual in the family. In this connection it is significant that the last male taken, on July 1, was dead when beaten from the tree.

In the paper cited a new species, *O. grisea*, was described, based upon a considerable series of females only. The absence of males was there commented on, and the hypothesis suggested that the males might occur early in the season and die soon after mating, the females persisting much later. Such proves to be the case. The past season's collecting in the type locality was begun much earlier than usual, and not only were many additional females of this new species taken, but the male was also found in considerable numbers, sixteen specimens having been secured in association with the opposite sex, three of them paired and in copulation. The dates of capture of the males ranged from June 22 to July 8, the latter date being the date of capture of the first female the season previous; and the host plant was usually *Quercus coccinea* as it had proved to be in the case of the female specimens taken the year before. The description of the male is therefore now available and is here presented:

Ophiderma grisea Woodr.

Male.—Allotype: Slender; hairy pubescent on face and pronotum, a little more sparsely posteriorly. Rather coarsely punctate, more or less glabrous. Pronotum in form as in female, though proportionally somewhat shorter. Color brown to black, vittæ creamy to white. Face and clypeus creamy to white, sutures and callosities black. Pattern as in male of *O. pubescens*, which it resembles, though much smaller, very much more slender, and generally darker. Elytra as in female, but black band crossing mid-elytra, so conspicuous in that sex, obsolescent, commonly not reaching margin. Body beneath black, abdominal segments edged posteriorly with pale. Legs pale, femora above and tibiae anteriorly black. Length 5-5½ mm.

Allotype in my collection. Taken by me at Litchfield, Conn., June 29, 1920, on *Quercus coccinea*. Paratypes will be placed in the National Museum at Washington and in the American Museum of Natural History at New York.

In the key to the species of the genus, presented with the paper above referred to, this male should perhaps best be placed in the group without dark mid-elytral band, as that character in this sex seems to be subject to a tendency to disappear, and so might find its place under *G.* (page 260) after ♂ *pubescens* Emmons (the length of which should read 5½-6 mm.), with indicia as follows:

Dark brown to black; slender, 5-5½ mm. in length; strongly arcuate humeral and transverse apical vittæ creamy to white; mid-elytral band indicated.

♂ *grisea* Woodr.

A careful examination of the material in the American Museum of Natural History has brought to light another female specimen which would seem to agree very closely with Goding's *O. flaviguttula*, and I have no hesitation in so assigning it. This example bears a label showing it to have been taken at Newark, New Jersey, May 29, 1910. Several males and females of the author's *definita* are also included in that material, and seventeen more well marked examples, eleven females and six males, have been taken this past season at Litchfield, Conn. The length of this form as given in the key is excessive, and should read ♂ $4\frac{1}{2}$ -5 mm., ♀ 5 - $5\frac{1}{2}$ mm.

NOTES ON THE CRAMBINÆ (LEPIDOPTERA).

By W. T. M. FORBES,

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A large part of the following memoranda are based on material collected in various parts of the southern states by the Cornell Biological Expedition in the summer of 1917, and by Prof. J. C. Bradley in his return trip through the same general region in the summer of 1918. The material has not quite all been mounted, but as it is a serious question when the mounting will be finished under present conditions, it has seemed best not to delay this paper further.

The discovery of various genera in which vein R_3 (vein 9) has disappeared, forces us to an extension of Hampson's definition of the subfamily (Proc. Zoöl. Soc. London 1895, 921), but emphasizes the relative value of the characters of the female frenulum and condition of the cell of the hind wing, used by Ragonot in defining his two subfamilies Crambiniæ and Ancyloleptiniæ (Ann. Ent. Soc. France (6), 10, 445-447, 1890). The subfamily may be defined as follows:

Pyralids with antennæ simple, laminate, or pectinate, without any special modifications; ocelli most often present; tongue rarely strong, sometimes absent; palpi porrect, beaklike, and sometimes very long; maxillary palpi large, and triangularly scaled; tibiæ with normal spurs. Fore wings with first A (1c) completely absent; usually with all veins from cell preserved, R_3 or M_2 sometimes lost, and R_4 also

fused with R_5 in *Raphiptera* and the new genus *Loxocrambus*; third A rudimentary as a rule, free. Hind wing with Sc and R anastomosing, with a strong fringe on base of Cu and three developed anals, in other characters of two principal types: (1) (Crambini) with frenulum multiple in female, cell widely open, the discocellular being reduced to a short spur attached to Cu stem, and M_1 approximate or stalked with R_5 ; (2) (Ancylolomiini) with frenulum simple in female, cell closed by a distinct though somewhat weak vein, and M_1 widely separated from distal part of R_5 at its origin from cell, and often somewhat weak. The tip of Sc is lost in the Crambine genus *Raphiptera*.

I should reject the two genera *Chalcoëla* and *Dicymolomia* from this group; their affinities are wholly with the genus *Glaphyria* and its kin, usually considered Pyraustinæ, but possibly worthy of a separate subfamily, based mainly on the character of the fringe on the base of Cu, which runs out diffusely into the outer part of the wing, diverging from Cu, and ends in a more or less striking tuft of spatulate scales. This group would be the Homophysidæ of Guenée, etc. The Schoenobiinæ I should separate primarily on the preservation of first A toward the margin of the fore wing, as this is a significant primitive character occurring in no other group of Pyralids known to me, and present in all Schoenobiinæ examined, even the strongly aberrant genus *Acentropus*. The fringe of hair on cubitus is in its weakest expression in the Crambinæ about like its fullest development in the Schoenobiinæ. I believe that *Loxotegopsis*¹ which lacks first A is not a Schoenobiid, but an aberrant Pyraustid. The Phycitinæ and Anerastiinæ, aside from their consistent loss of a radial, combine characters of the two tribes of Crambinæ. From the Ancylolomiini they differ in having R and M_1 of the hind wing approximate, from the Crambini in the more distinctly closed cell, and simple female frenulum. Very few have the large triangular maxillary palpi common to both groups of Crambinæ. I have omitted *Uscodys* from the following key, as probably Schoenobiid, since first A is preserved. Sc and R are separate in the hind wing, a very rare character in either group. I have noted from the type of *Uinta oreadella* Hulst, that R of the hind wing is from the

¹ I consider "*Loxotegopsis*" an obvious misprint.

upper angle of the cell, which is closed; as one radial is lost and the habitus phycid there remains nothing to associate the genus with the Crambinae, and it will go to the Anerastiinae.

M_1 (6) hind wing widely separated from Sc (8) at the level of the end of the cell, cell closed, female frenulum simple (ANCYLOLOMIINI).

Fore wing without any indication of notch at middle of outer margin; R well separated from Sc toward base in hind wing, R_1 free in fore wing;

M_2 lost **Eufernaldia**.

Fore wing (in our species) with a more or less distinct notch at middle of outer margin (very weak in *Surattha*, which has M_2 present).

Base of R widely separated from Sc. terminating practically opposite M_1 .
Mesolia.

Base of R terminating well above origin of M_1 , usually closely approximated to Sc.

R_1 free, notch slight **Surattha**.

R_1 normally anastomosing with Sc, notch stronger.

Fore wing five times as long as broad, outer margin strongly oblique **Pseudoschœnobius**.

Fore wing about three times as long as broad, each half of outer margin of fore wing nearly vertical.

Upper discocellular long **Prionapteryx**.

Upper discocellular very short or absent, M_1 normally apparently continuous with base of R. **Mesolia**.

M_1 approximate to Sc + R at end of cell or stalked (CRAMBINI).

A secondary apex developed at M_2 , the true apex truncate, obscure.

Loxocrambus.

Apex normal, at R_3 or R_4 .

R_5 stalked.

Two radials and a medial of fore wing and Sc and a medial of hind wing lost **Raphiptera**.

Venation complete or practically so.

Antennæ uni-, or bipectinate in male **Thaumatopsis**.

Antennæ laminate or simple **Crambus**.

R_5 from cell.

R_1 anastomosing or connected with Sc.

R_2 stalked with R_{3-5} ; ocelli lost **Iesta**.

R_2 from cell, sometimes imperfectly fused with stems of R_{3-5} but separate at origin.

Ocelli absent; tongue obsolete, palpi three times as long as head **Diatræa**.

Ocelli present.

Tongue present, though weak; palpi three times as long as head; Sc of hind wing typically with free part very short **Haimbachia**.

- Tongue present, though weak; palpi twice as long as head and more triangular; Sc of hind wing with free part long *Argyria*, part.
- R_1 free.
- R_2 stalked, ocelli present *Eoreuma*.
- R_2 free at origin.
- Front rounded, tongue distinct.
- Palpi projecting about length of head *Argyria*.
- Palpi projecting about twice length of head *Platytes*.
- Front conical, or with a central cone.
- Tongue well developed, R_1 arising from cell well before Cu_2 , ocelli present *Ommatopteryx*.
- Tongue rudimentary, R_1 arising opposite or beyond Cu_2 ocelli often absent *Chilo*.

Genus *Surattha* Moore.

S. santella Kearfott. Tucson, Ariz., July 22, 1917.

Genus *Prionapteryx* Stephens.

Dr. McDunnough calls my attention to the fact that the types of *Mesolia* and *Eugrotea* are congeneric, in fact closely related, so that the name *Eugrotea* is unavailable as used by Kearfott. The best way out would seem to be to divide the series considered *Eugroteas* by Kearfott according to the condition of M_1 of the hind wing, and put those with M_1 from the anterior angle of the cell, at nearly the same point as R , in *Mesolia*, and the rest in *Prionapteryx*. The first group also agrees with *Mesolia* in having a dentate t. p. line and include *olivella* and *huachucella* as well as *dentella*. Of the latter I have only seen *yavapai*, which has an even t. p. line like *Prionapteryx*.

P. nebulifera Steph. Brown's Mills, N. J., July 6, 1919 (F. H. Benjamin).

P. yavapai Kearf. Wellton, Yuma Co., Ariz., Aug. 6, 1917.

This series shows an extraordinary amount of variation in venation. Not one specimen matches Kearfott's figure. In one case R_2 and M_1 are stalked half way to the outer margin, and in another they are barely stalked, but generally they are free. M_2 and M_3 are stalked in six specimens, one of which shows only a rudiment of M_3 on one side; they are united in seven. In the hind wing they are consistently united. Sc and R of the fore wing are normally connected by a very short cross-vein, but they often anastomose at a

point, and on one side of one specimen appear to become coincident, as in Kearfott's figure.

Genus *Mesolia* Ragonot.

M. olivella Grote. Camden, Ark., June 2, 1918.

This is the species which generally passes for *dentella*. The latter is considered by Barnes and McDunnough the same as *incertella*.

M. huachucella Kearfott. Mesquite near Mesilla Park, N. M., July 12, 1917; Lordsburg, July 13, 1917; Tucson, Ariz., July 22, 1917.

This species is very close to the type of the genus, and has R_1 free.

Genus *Pseudoschoenobius* Fernald.

P. opalescalis Hulst. Deming, N. M., July 12, 1917.

Genus *Eufernaldia* Hulst.

This genus is quite a typical Ancylolepidid, though it has always been placed with the Crambid genera. It was taken at Marfa, Tex., May 15, 1918; and at Limpia Cañon in the Davis Mts., Tex., on July 7, 1917, at over 5000 feet elevation; both times at light in grass-land.

Genus *Raphiptera* Hampson.

I should interpret this genus as Crambid in the restricted sense, rather than Ancylolepidid. The cell is widely open and there is no trace of a vein from its end, so that it seems most probable that Sc has been lost, rather than M_1 as Hampson indicates. The pattern is also Crambid. I have typical *minimella* from Anderson, S. C., June 5, 1917, and Leroy, Ala., June 11, 1917. Specimens from the vicinity of Ithaca (McLean Bogs, Tompkins Co., N. Y.) appear to be *argillaceella* rather than *minimella*, but I am not at all sure the forms are distinct species. Fernald reports *minimella* from New York, but it may be from the austral part of the state. The *minimella* from Anderson were taken at a trap lantern in oak woods, and the one from Leroy in the same way on the bank of a creek in pine and oak woods. The *argillaceella* from McLean on the other hand are confined to the heath-cover of a couple of peat-bogs, as is the species at Mer Bleue, Ontario.

Genus *Crambus* Fabricius.

In this genus the group with Sc anastomosing with R_1 in the fore wing is larger than would be expected from Hampson's grouping. The eastern species with anastomosis include *C. albellus*, *hortuellus*, *trisectus*, *caliginosellus*, *zeellus* and *luteolcellus* as well as doubtless *laciniellus*. A number of western species also show the character.

C. quinquareatus Zell. Biloxi, Miss., June 13, 1917; Needles, Cal., April, 1918.

It is obvious from Walker's description and type locality, that Walker's species *hastiferellus* is not this. I believe *hastiferellus* is a synonym of *leachellus*, with which its description agrees more closely.

C. leachellus Zinck.

Specimens from Mesquite, near Mesilla Park, and Deming, N. M., July 12, 1917, and Lampia Canyon, Davis Mts., Tex., July 7, appear to be a very pale race of this species. The fore wing is shaded with yellow and light brown, almost like *C. alboclavellus*, but the markings are about as in *leachellus* and *carpenterellus*. Unlike *leachellus* there is a distinct white marginal patch, over veins 3-5, contrasting with yellow areas above and below. I have also seen the form in the Barnes collection.

Crambus biguttellus new species.

General structure and habits of *C. albellus* Clem. Fore wing with R_1 free from Sc, R_5 stalked more than half way to apex (a third way in *C. albellus*). Apex blunt, not at all produced, outer margin distinctly excavate at middle, the bottom of the indentation at M_2 .

Head and thorax white above, collar with a broad diffuse pale gray-brown band on each lobe. Abdomen dirty white. Antennæ light fuscous. Sides of palpi white above, fuscous below; maxillary palpi white, with a narrow black ring. Fore legs fuscous, distally gradually shading into white on coxæ; middle and hind legs white, with dirty white tarsi.

Fore wing silver white; base of costa pale yellowish brown; extreme costal edge blackish toward base; no other basal markings. Post-medial line yellowish, oblique outward from middle of costa to end of cell, where it bends an acute angle and runs into a rounded black spot on lower edge of cell at middle of wing. Thence it continues obliquely inward to a similar spot on middle of inner margin, but is very faint and broken. The upper spot is lightly edged with ochreous, the lower with hardly a trace of ochre edging. Subterminal line light yellow, running across apex, then sharply curving at M_2 (vein 5) and

running closely parallel to outer margin, to anal angle. Two parallel lines trisect the space between the subterminal line and the apex, but fade out below, leaving a narrow continuous white margin. Terminal line fine, black at costa only, faintly continued to the notch. A yellow marginal shade below the notch, containing three black dots, in cells M_3 , Cu_1 , Cu_2 , the middle spot notably weaker than the other two. Fringe white above notch, with a faint yellow tint, lead-gray below, but shading into white again at anal angle. Hind wing yellowish white, with pure white fringe. Under side of fore wing dirty yellowish white with the three black marginal dots larger but less intense; hind wing white. 11 mm. Two males, Schriever, La., June 17, 1917, taken at light at edge of woods. Cornell U. type and paratype number 464.

In Fernald's key this species will run to *C. pusionellus*, but it is much smaller, there is a distinct black spot on the middle of the wing, and the st. line is single except toward the costa, and much nearer the outer margin. From *C. albellus* it differs in wing-form, in having only three marginal dots above and below instead of five, in the two median black dots, and the white hind wings.

***Crambus immunellus* Zell., new race *minor*.**

Our specimens are evidently varietally distinct from Zeller's South American *C. immunellus* (Stett. Ent. Zeit., 1872, Pl. 2, f. 6; Horæ Soc. Ent. Ross., 13, 47, 1877), but seem more closely related to it than to the northern *C. elegans*. This form is smaller than *elegans* or *immunellus*, the ground largely whitish with a rather distinct blackish shade along the costa, which is cut by the strong oblique white median and subterminal bars, but extends well beyond the latter. The blackish marking on the inner margin is smaller than in *elegans* and tends to be divided on A, but is black rather than brownish. The submarginal line is suffused except at the costa, with only traces of a pale center-line, and tends to be a little dentate, especially on its inner border. It turns sharply away from the outer margin toward the costa and meets the costa barely four fifths way out. The terminal dots are much heavier than in *C. elegans*, the first two being elongate and almost running together. The hind wing and under side appear paler than in *elegans*, and the labial palpi are white with heavy blackish bars covering half the surface of the second and third joints, instead of the solidly darker outer face of *elegans*. From typical *immunellus* the form may be distinguished by the suffused, mostly dark submarginal line, the smaller size, and probably more intensely black dorsal crescent; from *C. polingi* by the small size and separate terminal dots. 10 to 12 mm. Two males, both at light. Type Biloxi, Miss., June 13, 1917; paratype Schriever, La., June 17, 1917, Cornell U. number 465.

***C. teterrellus* Zell.**

The dominant species in Alabama, Mississippi, and Louisiana.

C. coloradellus Fern. Mesquite, near Mesilla Park, N. M., July 12, 1917.

- C. intermedius* Kearfott. Gillett (Karnes Co.), Tex., June 25, 1917; Richmond, Tex., June 22, 1917; Columbus, Tex., May 23, 1918.
C. nevadellus Kearf. Victorville, Cal., May 30, 1918.
C. dimidiatellus Grt. Mesquite, near Mesilla Park, N. M., July 12, 1917; Phoenix, Ariz., May 7-8, 1918.

Genus *Haimbachia* Dyar.

The condition of the tongue seems unstable in closely related species of the Crambinae, and the presence of the ocelli would seem a better character to separate this genus from *Diatraea*. Sc of the hind wing also appears a little shorter. I believe the genus should be extended to include *damon*, *squamulella*, *prosenes* and *parallela*. *H. damon* has reduced ocelli distant from the eye, and will form a transition to *Diatraea*, but I cannot see the connection with *Platytes*. *Squamulella*, *prosenes* and *parallela* do not seem to differ in any significant way from *placidella*, in fact *squamulella* is very close. The latter is generally confused with a related species which has a well-marked conical front, but if I am right in my determination the front is smooth in the true *squamulella*. *Parallela* is different in appearance, but the rest immediately suggest *placidella* in the course of the t. p. line close to the margin. *Venosalis* Dyar should be compared with *Diatraea*. (Ins. Ins. Men., 5, 87.)

Genus *Thaumatopsis* Morrison.

- T. pectinifer* Zell. Victoria, Tex., June 24, 1917, at light.
T. edonis Grt. Brown's Mills, N. J., Sept. 1, 1919.

Genus *Ommatopteryx* Kirby.

- O. texana* Rob. New Braunfels, Tex., June 26, 1917; Texas Pass, Ariz., July 19, 1917, Needles, Cal., Apr. 1-6, 1918; Indio, Cal., May 1, 1918.

Examination of the genitalia shows that our species is structurally distinct from the old-world *O. ocella*. The principal difference is in the row of spines on the ædeagus, which consists of 13 or 14 rather short and similarly formed spines in our species, but in *occella* has two types of spines, the twelve or fourteen proximal much like these of ours, but followed by a more distal series of nearly as many more slender closely crowded spines.

Genus *Argyria* Hübner.

Our species of this genus form two clean-cut groups. The typical section has palpi projecting about as far as the length of the head, rounded and not prominent front, and Sc free and nearly straight, as usually described. It includes *A. nivalis*, *rileyella*, *argentana*, *lacteella* and the majority of the tropical species. The other group, with *A. auratella* (including its southern form *pulchella*), *A. critica*, described below, and doubtless Dyar's *A. jonesella* from the neotropical region, has much longer palpi, as long as the thorax, more or less conical front and Sc anastomosing with R. The tongue is also weaker and the species approach *Diatraea*, differing mainly in the rather shorter, stouter palpi, presence of ocelli, and silvery coloring.

A. rileyella Dyar.

There is a specimen in our collection, taken by Dr. J. C. Bradley at Spring Creek (Decatur Co.) Ga., May 18-21, 1916; which definitely fixes this species as North American. Dr. Barnes has also a series from Southern Pines, N. C. It was described without locality, and does not appear in our lists.

A. argentana Martyn. Richmond, Tex., June 22, and Wharton, Tex., June 24, 1917.

A. lacteella F. Ala., La. and Miss., June, 1917.

A. auratella pulchella Walk.

This name may be applied to the small southern form of *A. auratella*, which does not appear to differ in markings. Devers. Tex., June 21, 1917.

Argyria critica, new species.

This form is very close to *auratella* and may not be distinct, but as it differs visibly in frontal structure, and will run differently in Dyar's key (Ins. Men., 1, 111), it may receive a name.

Front rounded out, about a quarter as far as width of eye, and much less prominent than in *A. auratella*. Male antennæ not quite so broad as in male *auratella*. Sc and R of fore wing anastomosing. Silver white, marked with golden yellow. Head yellow, face white with yellow borders; vertex broadly white. Palpi yellow, white on upper side and at tips. Collar yellow with a white middorsal band. Thorax white with a triangular golden yellow patch on each side of disc, partly covered by the white tegulae. Under side white, front of fore coxae, remainder of fore legs and outer face of middle legs yellow. Abdomen white.

Fore wing white, costal edge finely edged with yellow, hardly showing above. A broad, somewhat irregular oblique median fascia from costa at three fifths, to inner margin at two fifths, extending somewhat outward along costa and inward along inner margin, but not out along inner margin. It is partly edged with brown and black scales. There is no trace of yellow on distal half of inner margin. Terminal line umber brown, fringe yellow, shining, rather deeper at base. Hind wing white. Under side of fore wing with a slight yellow tint, deepening on the fringe. 15 mm. Gibsonville, N. C., June 3, 1917. Type and paratype males in Cornell U. collection, type number 466. Trenton, Ont., July 6, 1911; Caldwell, N. J., July 30, 1904; Mt. Airy, Pa. (P. Laurent); New Brighton, Pa., July 5-Aug. 9; Everglade, Fla., Apr. 8-15; Hastings, Fla., Apr.; paratypes in Barnes collection. Utica, N. Y., July 14, 1918 (C. R. Crosby).

Our species of *Argyria* may be separated as follows:

Fore wing with transverse golden fascia, palpi long, R_1 joining Sc.

Outer half of inner margin yellow *auratella*.

Larger, 16 mm. race *auratella*.

Smaller, 10 mm. race *pulchella*.

Outer half of inner margin white *critica*.

Fore wing with faint transverse line or none, palpi short, R_1 free.

Head white, palpi largely white.

Vertex all yellow, fore wing with a black subapical bar, 10 mm.

..... *lacteella*.

Vertex white in center, no subapical bar, 18 mm. *nivalis*.

Head and palpi deep yellow.

A golden streak along inner margin, no transverse markings. *argentana*.

Inner margin wholly white; a faint excurved transverse line and apical streak *rileyella*.

Genus *Platytes* Guenée,

P. multilineatella Hulst. Theodore, Ala., June 12, 1917; Biloxi, Miss., June 13, 1917.

P. panalope Dyar. Biloxi, Miss., June 13, 1917.

Genus *Eoreuma* Ely.

E. densellus Zell. Sabine River Ferry, La., opposite Orange, Tex., June 20, 1917; Devers, Tex., June 21.

The specimens show definitely the characters of *Eoreuma*, with R_1 free and R_2 stalked.

Genus *Chilo* Zincken.

"*Diatraea*" *alleni* and *differentialis*, and "*Chilo*" *forbesellus* and *comptulalis* have R_1 free like *Chilo*, but lack ocelli, like *Diatraea* and

Iesta. They would seem to go together, and with our present tendency to emphasize ventational characters would naturally be placed in *Chilo*. The larva of the type of *Chilo* differs from that of *Diatræa* in having only two lengths of hooks on the prolegs, and having the circle open on the outer side, so that when the larvæ of other species become known we are likely to have collateral evidence.

Genus *Iesta* Dyar.

- I. *lisetta* Dyar. Ft. Myers, Fla., May, 1916; J. C. Bradley; Leroy, Ala., June 11, 1917.

Genus *Diatræa* Guild.

- D. *evanescens* Dyar. Biloxi, Miss., June 13, 1917; Schriever, La., June 17; Richmond, Tex., June 22.
D. *saccharalis* F.

The early stages of this species show some unexpected characters, necessitating a widening of the definition of the subfamily. The larva shows the general characters of the family Pyralidæ, with simple setæ, bisetose prespiracular wart, iv and v of the abdomen on the same tubercle, and a complete circle of irregularly triordinal hooks on the prolegs. The other characters are as follows: Vertex closed, adf. ending abruptly about a third way up to vertex; front small and quite narrow. Prothorax with cervical shield normal; beta higher than alpha, delta higher than gamma, and slightly behind beta, gamma, epsilon and rho forming nearly an equilateral triangle, closer together than the other setæ. Prespiracular and subventral each with two setæ, horizontally placed. Meso- and metathorax similar, with ia + b, iia + b; iv + v on a small plate, and iii on the posterior edge of a large one; vii of two setæ (like the *Galleriina*, *Crambus* has a single seta), lateral minute primaries on a large plate; scutellum large, chitinized, without setæ. Abdomen (A3-6) normal, with iii nearly above spiracle, iv above and slightly behind v on the same tubercle, vii of three small setæ, the posterior slightly the longest; hooks of prolegs irregularly bi- and tri-ordinal. A2 similar, the setæ vii in a triangle, A1 with 2 setæ vertically placed. A7 has two horizontally placed setæ. A8 has the spiracles enlarged, facing back and much nearer dorsal line, with iii directly in front; the plates of i and ii fused across the dorsal line and vii single. On A9 ii is fused across the dorsal line as in many Tortricids, iii (rho) is minute on

the lower edge of the plate of i, iv and vi are lost, vii simple. These characters are crambid except for the preservation of a second seta at the bases of all the true legs; the type differs from the Galleriinae in the nearly vertical, rather than horizontal placing of the setæ iv and v on the abdomen, the partly triordinal, rather than uni- and biordinal hooks, and the placing of the setæ of Ag which are in a nearly vertical series. *Chilo phragmitellus* also has the double setæ on T 2 and 3, so I suspect Fracker's specimen of *C. plejadellus* was defective; *phragmitellus* differs in having rho of the prothorax rather lower than epsilon and distant from gamma as well as the different proleg mentioned above, but has the characteristic last spiracle of *Diatraea*.

The pupa of *D. saccharalis* is similarly aberrant, and also shows some characters of the Galleriinae. It is typical of the Pyralidæ, but will run to the Galleriinae in Miss Mosher's key, on account of the short maxillæ, less than half as long as the fore wings, and obscure pilifer. There is no middorsal ridge on the body and the sculpture is of raised reticulations rising into pyramidal points, rather than of spines. The prothorax is Galleriid, nearly half as long as the mesothorax. The other characters are: head with anterior rugosities, obscuring the sutures, prothorax nearly $\frac{1}{2}$ mesothorax in greatest length, mesothorax with prominent sharp shoulders at base of wings, overhanging deep grooves on the prothorax; labrum on ventral surface of body; maxillæ $\frac{1}{2}$, the fore legs meeting behind them; labial palpi lanceolate, as long as middle width of tongue, max. palpi a minute triangle at base of middle legs, fore femora visible; A10 well set off by a dorsal and lateral transverse groove, with shallow lateral furrow; cremaster obsolete, represented by a system of pyramidal points on last three segments, without obvious setæ.

Genus *Loxocrambus* new genus.

This form is evidently a derivative of *Crambus*, differing mainly in the reduced costal venation and very early separation of M_1 from Sc and R in the hind wing. It will run to *Culladia* in Hampson's key, but differs in wing form, and in the anastomosis of Sc and R. The two genera appear to be separately derived from different groups of *Crambus*. So far as I know, the secondary apex at M_3 is unique in the Pyralids.

Head about as in *Crambus*. Male antennæ slightly prismatic, tongue very weak, but coiled. Ocelli present. Eyes large. Thorax and legs scaly, normal. Fore wing with the apex rounded over, truncate, with a slightly increased curvature over R_{3+4+5} , but with the apparent apex at M_3 . Cu-stem higher than usual in the wing, with a very wide space between it and second A, but without any trace of first A. Three radials only, the first short, running into Sc, which ends free in the membrane; the other two also free, and not quite reaching the margin. M_1 free, normal, M_2 and 3 connate, cell open, third A obsolescent, free, as usual. Hind wing with base of R obsolete, M_1 apparently arising free, a third way out from base, but obscurely connected with $Sc+R$, which immediately diverge from it and separate from each other two thirds way out to the apex. Cell open, with hardly a trace of the discocellular, abnormally short on the anterior side, as indicated by the early separation of M_1 from $Sc+R$, but abnormally long on the lower side.— Cu_2 arising more than half way out on the wing, widely separate from Cu_1 . M_2 and 3 stalked. All anals normal. Type: *L. canellus* n. sp.

***Loxocrambus canellus* new species.**

Light clay color, streaked with white on the veins. Head white, palpi shaded with clay color on outer side. Legs dirty white, fore legs darkest, as usual. Thorax apparently white (greasy in all my specimens), the side of the collar and tegulae clay color. Fore wing with costa and cell suffused with white, leaving a little darker shading between the veins, and some blackish sealing in the upper outer portion of the cell. Cell M_1 white, except narrowly along the veins, from discal cell to outer line, indicating the fold. Inner line even, dark gray, forming an acute angle over end of cell, enlarging into a black spot and then fading out, but more or less traceable to middle of inner margin. It tends to show an ocellate spot just above A. Outer line dark gray, fine, even, about two thirds way from inner line to apex, running parallel to outer margin as far as M_2 ; then turning obliquely in, and running nearly straight across to anal angle. Terminal space white above M_3 and clay color below, with concolorous veins. Three black spots in interspaces at apex, set well back from margin. Fringe concolorous, hind wing white. Under side white, immaculate, a little darkened toward costa of fore wing. 15 mm. Four males, Biloxi, Miss., June 13, 1917, at light. Type and paratypes in Cornell U. collection, No. 467.

The larva is possibly a borer, as the moth becomes greasy much more readily than *Crambus*.

Loxocrambus mohaviellus new species.

Similar to *L. canellus*, but noticeably darker and slightly larger.

Pearl gray, shaded with ochreous brown, especially above the anal vein out to the post-medial line, and along the costal edge beyond. Head pearl gray, much darker than *L. canellus*; the palpi darker on the outer side. Disc of thorax concolorous, the sides of the collar and tegulae darker and browner gray. Fore wing dull ochreous, as far as the post-medial line, the costal edge and inner margin below vein A pearl gray. A streak of blackish and white dusting between Sc and R, and more diffuse streaks in outer part of cell, below Cu and above and below A. A strong white streak along Cu. Post-medial line whitish followed by brown the brown darkening into black dots opposite end of cell and on Cu; the line obscure below Cu₂ in the type, and wholly obscure in the paratype. Post-medial region pearl gray, streaked with white on the veins, except A, and on the lower interspaces. St. line deep brown, followed with white. Terminal space pale pearl gray, less yellowish than in the post-medial region, shading into pale brown at costa, and straw yellow along dorsal part of outer margin. Two terminal dots, located as in *L. canellus*. Terminal line in base of fringe black on costa, obsolete below. Fringe light, with a black line in outer part, and white scale-tips. Hind wing and legs pearl gray. Under side pearl gray, terminal dots as above, and lines in fringe brown. 20 mm. Victorville (Mohave River), Cal., April 30, 1918, at light in the town. Type and paratype male Cornell U., No. 468.

MISCELLANEOUS NOTES AND RECORDS OF LOCAL LEPIDOPTERA, WITH THE DESCRIPTION OF A NEW FORM.¹

By FRANK E. WATSON,

NEW YORK, N. Y.

The following records were taken, unless otherwise stated, from my collecting notes, in the belief that they will be of use for state and local lists and it is hoped that they will prove of interest as well. I have also included the more interesting observations which were made while on an automobile trip, through New Jersey and Pennsylvania, during July, 1917, as a guest of Mr. G. C. Hall. These notes are enclosed in brackets and Mr. Hall should be credited with the writer for them.

¹ Read, in part, before the New York Entomological Society.

Papilio cresphontes Cramer.

One larva, about ready to pupate, found on gas-plant or burning-bush, *Dictamnus albus* Linné, in a garden at Waterbury, Ct., was received at the Museum, together with a specimen of the food-plant, for determination. Coll. Amer. Mus. Nat. Hist.

This garden-plant is a variable species of the Rue family (Rutaceæ) and occurs from southern Europe to northern China. It has a strong odor of lemon and will give off a flash of light on sultry summer evenings when a lighted match is held under the flower-cluster near the main stem.²

The above plant seems to be fairly well known as a food plant of *cresphontes*.

Pieris protodice f. *vern. vernalis* Edwards.

One specimen captured at Lakewood, Ocean Co., N. J., on April 26, 1906. Coll. F. E. W.

Pieris rapæ (Linné).

One pupa found during the latter part of August, 1908, attached to the underside of a leaflet of *Cassia marylandica*. I raised this plant from seed in a large flower-pot on my roof and it was the only plant there. The leaves were well chewed near the pupa, and there were no other larvæ to be found, so that the *rapæ* caterpillar must have fed on the *Cassia*, a female in flying over the roof having deposited an egg on it. A normal female subsequently emerged. This is rather a strange food for *rapæ*. Locality, Morrisania, New York City. Coll. F. E. W.

Eurymus philodice (Godart).

One nearly full-grown larva was found by W. A. Friedle on a young plant of *Robinia pseudacacia* at Washington Heights, New York City, September 14, 1916. It continued to feed on this plant until fully grown, making a crippled pupa from which the adult failed to emerge.

Danaus archippus (Fabricius).

About 5 P. M. on July 14, 1907, while returning from a collecting trip to Lakehurst,³ I found near South Lakewood,³ four nearly

² Botanical notes by J. B. Keller in L. H. Bailey's Standard Cyclopedia of Horticulture, Vol. II, 1914, p. 1004.

³ Both towns are in Ocean County, N. J.

full grown larvæ on a large bushy plant of *Asclepias tuberosa*. Number one was resting on the underside of a leaf. Number two was eating the flowers of a small cluster which projected horizontally from the inflorescence. The larva held on to the main stalk just below the flowers with its fourth and anal pairs of prolegs and was able to reach the flowers. It assumed a horizontal position but with the anterior segments arched backward and partly downward. Number three, on another stalk, was chewing the stem just beneath the flower cluster. Number four was feeding on the flowers of still another cluster. It held on to the stalk in the same manner as number two, with its anterior segments arched backward and downward. The flower cluster upon which this larva was feeding was hanging down; the peduncle had been chewed partly through, a very wide V-shaped portion of the stalk having been eaten out. A number of other flower-heads on various plants of *A. tuberosa* were observed hanging downward with their stems partly cut through.

Do the larvæ cut the stems so as to assume a comfortable position when feeding, *i.e.*, to bring the food within easy reach, or does the attitude when feeding on the cut flower-heads offer some protection? As the larvæ when feeding as described above were directly beneath the inflorescence, they were somewhat sheltered from the sun.

I have not noticed any published notes of *archippus* larvæ in the last instar feeding on milkweed flowers, although young larvæ have been recorded as so feeding and eggs have also been found among the flowers. As a matter of fact, I have a number of times found both eggs and young larvæ on the buds and flowers of various species of *Asclepias*.

Early and late records for the imago: one specimen seen flying near the Amer. Mus. Nat. Hist., on October 2, 1916; a second specimen was observed at the same place, flying during a light shower, on April 23, 1917.

Neonympha phocion (Fabricius).

[One fresh individual captured at Richland, Atlantic Co., N. J., July 17, 1917.]

Euphydryas phaëton (Drury).

[Common at Cape May Court House, N. J., July 16, 1917.]

Polygonia progné (Cramer).

Although this species occurs in two forms, a summer and a winter or hibernating form, only the above name has heretofore appeared in our local lists. Form *progne* (Cramer) is here applied to the late summer or autumn brood and from *l-argenteum* Scudder to the early summer generation. With a view to adding the form *l-argenteum* Scudder to our local lists, the following records are offered. All the material is in my local collection and was collected by me unless otherwise stated.

f. aut. *progne* (Cramer).

April 20, '02, one specimen, Hemlock Falls, Essex Co., N. J.;

July 24, '10, two specimens, Fort Montgomery, Orange Co., N. Y.;

July 31, '04, one very old specimen, Van Cortlandt Park, New York City, N. Y.;

August 2, '03, one specimen, Sloatsburg, Orange Co., N. Y.;

August 30, '08, one specimen, Andover, Sussex Co., N. J.;

September 8, '10, one specimen, Big Island, Orange Co., N. Y. (Dr. F. E. Lutz), Coll. Amer. Mus. Nat. Hist.;

September 20, '14, one specimen, Pine Island, Orange Co., N. Y., Coll. Amer. Mus. Nat. Hist.

September 21, '10, one specimen, Woodbury Falls, Orange Co., N. Y. (Dr. F. E. Lutz), Coll. Amer. Mus. Nat. Hist.;

October 11, '18, one fresh female, Van Cortlandt Park, New York City, N. Y. (A. B. Klots), Coll. A. B. Klots.

f. æst. *l-argenteum* Scudder.

June 24, '06, one specimen, Fort Montgomery, Orange Co., N. Y.;

July 1, '06, five specimens, from last mentioned locality, one of which was collected by G. C. Hall and is in his collection;

July 1 and 2, '09, one specimen each date, Greenwood Lake Glens, Passaic Co., N. J.;

July 3, '03, one specimen, Sloatsburg, Orange Co., N. Y.;

July 4, '05 and '06, one specimen each date, Fort Montgomery, Orange Co., N. Y.

Aglais milberti (Godart).

One specimen seen near the Amer. Mus. Nat. Hist. on October 26, 1916. One individual observed at Washington Heights, New

York City, on March 29, 1918. [Young larvæ rather common on *Urtica gracilis* at Mashapacong Pond, Sussex Co., N. J., July 18, 1917.]

Aglaia antiopa ab. *hygiæa* (Heydenreich).

On September 21, 1907, a colony of about seventy-five larvæ were collected on a *Populus deltoides* which was growing in a street near my home in Morrisania, New York City. The larvæ were on their mats of silk and about ready to moult for the fourth time. As elm could be more easily procured, it was provided and the larvæ, after moulting, ate it readily. About fifty pupæ were obtained, which I divided equally with Mr. Harvey Mitchell of Westwood, N. J. All of the specimens from my lot, some of which emerged as late as November 6, were of the typical form. From Mr. Mitchell's portion, two *hygiæa* and six transitional specimens emerged on October 28. Coll. F. E. W.

Mr. Mitchell's lot of pupæ were not sent through the mails but carried by him to his home in Westwood. They had been placed by me in a tin box between layers of cotton and travelled, in this manner, thirty-five miles by rail. All pupæ were kept indoors and were not subjected to any abnormal conditions. Was the jarring in transit the cause which produced the aberrant specimens? I have heard this explanation given but do not suggest it myself.

Chlorippe clyton f. *proserpina* (Scudder).

This form has not heretofore appeared in any of our local lists although the typical form, *clyton* (Boisduval and Le Conte) is not uncommon in the vicinity of Maplewood, Essex Co., N. J., and has been recorded in The Insects of New Jersey, Report of the New Jersey State Museum, 1909, p. 412. The form *proserpina* (Scudder) is relatively scarce and seems to be confined largely to the females. In a very large bred series, in my local collection, there are only five males and thirteen females. Transitional specimens occur. The emergence dates average from June 15 to July 15, extremes being June 14 and August 20.

Heodes epixanthe (Boisduval and LeConte).

[Extremely abundant in a cranberry bog near Toms River, Ocean Co., N. J., July 15, 1917. Most of the specimens were old and worn, but a few were freshly emerged.]

Achalarus lycidas (Smith and Abbot).

[One individual observed at Richhill, Bucks Co., Pa., July 17, 1917.]

Polites manataaqua (Scudder).

[One specimen taken at Palermo, Cape May Co., N. J., and a second one at West Cape May, N. J., July 16, 1917.]

Poanes massasoit (Scudder).

[One male, of the typical form, and one female, transitional to the form *suffusa* (Laurent), both in fresh condition, were captured at Malaga, Gloucester Co., N. J., July 17, 1917.] Coll. Amer. Mus. Nat. Hist.

f. *suffusa* (Laurent).

[One male and one female, both fresh, were taken at Malaga, Gloucester Co., N. J., July 17, 1917.] Male in collection G. C. Hall; female in collection Amer. Mus. Nat. Hist.

Poanes hobomok f. ♀ *pocahontas* ab. *friedlei*, new aberration.

This aberration differs from typical *pocahontas* (Scudder) in the obsolescence of the white markings, particularly on the upper side which is almost immaculate. Primaries, above, with only three subapical spots present and much smaller than in normal specimens. The band of white spots on the outer third of the wing has almost completely disappeared, the spots being barely indicated by a few diffused whitish scales. There is also a small whitish spot in the apical angle of the cell. Secondaries, above, immaculate. Primaries, below, with the spots repeated, and relatively strong and distinct but greatly reduced from those present in normal individuals. A second small spot here appears below the first near the distal end of the cell. Bluish gray marginal border also reduced. Secondaries with the pale wide central band barely discernable owing to the lack of the pale scaling generally present in normal individuals. The pale spot near the base between veins 7 and 8 can scarcely be made out. Bluish gray marginal border greatly reduced. Specimens somewhat undersized, expanding 36 mm.⁴

Holotype female, Van Cortlandt Park, New York City, N. Y., Sept. 10, 1906, from the author's collection, now in the Amer. Mus. Nat. Hist. Named for my friend Mr. Wm. A. Friedle.

The above specimen is one of two which I bred from eggs deposited by a female *hobomok* (Harris) captured in Van Cortlandt Park

⁴ Measurements were taken from the center of thorax to each apex and added.

during the early summer of 1906. The larvæ and pupæ were kept in a cool damp cellar and despite the fact that in this vicinity there is but one generation a year, the two pupæ obtained produced a male *hobomok* and the aberrant female *pocahontas* (named above) during September of the same season. The male, which emerged on September 11, is slightly undersized and somewhat darker than average specimens of *hobomok* (Harris). Male in author's collection.

Euphyes conspicua (Edwards).

[One male and two females, all in fresh condition, Malaga, Gloucester Co., N. J., July 17, 1917.]

Megistias fusca (Grote and Robinson).

[One old specimen taken at Cape May Court House, N. J., July 17, 1917.]

Prenes panoquin (Scudder).

[One specimen collected at Palermo, Cape May Co., N. J., and another at Cape May Court House, N. J., July 17, 1917.]

Samia cecropia (Linné).

On September 7, 1916, at Washington Heights, New York City, a nearly full-grown *cecropia* larva was noticed on a wild cherry bush with a Tachinid fly, *Winthemia quadripustulata* (Fabricius),⁵ sitting near by. The fly assumed a position on a leaf at right angles to the larva, its head not quite touching it. It then bent its posterior abdominal segments downward and forward and extended its exceedingly long flexible ovipositor beneath its abdomen, forward and upward to the level of the top of its head, or slightly higher and thence to the dorsal region of the posterior segments of the larva, in this instance, and deposited the egg. A number of eggs were thus laid before capturing the fly. Previously to the above observation, a fly, probably this one, had deposited eggs on the lateral regions of the anterior segments. The larva was well covered with eggs, numerous old ones having hatched, black spots showing on the larva at the ends of the eggs where the Tachinid larvæ had bored into the caterpillar.

Three eggs laid this date about 12 o'clock noon, were left on the

⁵ Determined by Dr. J. Bequaert.

larva, others were put into a bottle. In both groups, eggs began to hatch on the 9th about 9 A.M. The egg period is therefore about two days.

The *cecropia* did not eat after the 8th and began to decrease in size. It died on the 13th, finally turning black.

Full grown larvæ were seen emerging on the 25th and kept on emerging during the 26th and 27th. On the evening of the 28th, four large larvæ could be seen in the remains together with numerous small larvæ, these latter perhaps belonging to another species. Some of the large larvæ formed pupæ from which the adults failed to emerge. Coll. Amer. Mus. Nat. Hist.

Tropæa luna (Linné).

One nearly full grown larva was found on hickory, September 23, 1916, at Pearl River, Rockland Co., N. Y. On April 9, 1917, a rather undersized female of the normal form emerged, not spring form *rubromarginata* Davis. Mr. Davis suggests that the above is due to the pupa having been kept in the house, *i.e.*, under artificial conditions. The cocoon was, however, kept in a wire breeding-cage and in a very cold room. Coll. Amer. Mus. Nat. Hist.

Macronoctua onusta Grote.

In June, 1917, we received at the Museum, several young larvæ and their workings in cultivated *Iris*. These were collected by Mr. R. G. Van Name in his garden at New Haven, Conn., where they are very destructive to his *Iris*. Early in September, Mr. Van Name dug up several pupæ from his *Iris* bed and sent them to us. One imago emerged on September 20 and three on September 21. Coll. Amer. Mus. Nat. Hist.

Phobetron pithecium (Smith and Abbot).

On the afternoon of September 23, 1916, one nearly full-grown larva was collected on white oak at Pearl River, Rockland Co., N. Y. A twig of the oak with the larva was placed in a satchel as I had no receptacle for larvæ with me. A twig of hickory with a larva of *Tropæa luna* (Linné) was then placed on top of the oak. About one hour later I looked into the satchel to see how the larvæ were getting along and found that the *pithecium* had, of its own accord, left the

oak and was eating the hickory. It continued to feed on the hickory until the morning of the 25th, when I transferred the larvæ to glass jars. The *pithecium* was given the white oak, on which it fed until full-grown, spinning a normal cocoon.

WINTER COLLECTING NOTES ON FLORIDA RHOPALOCERA.

By E. L. BELL,

FLUSHING, N. Y.

Under this heading is given a short account of the experiences of three amateurs during their visit to Florida during the winter, from about the middle of January, 1920, to the latter part of March, of the same year.

My father, mother, and sister, none of whom had had any previous experience in collecting insects spent the time mentioned at Tampa, Florida, excepting about two weeks spent at Dade City, a small place some forty miles northeast of Tampa. Tampa is, of course, the well-known city on the west coast of Florida about 250 miles on the railroad, southwest of Jacksonville, Florida. Before starting their trip I gave them instructions in collecting and pinning the insects, and supplied them with nets, cyanide jars, pins, cork-lined boxes, etc., and with some anxiety awaited the outcome, for insects collected by those who have had no experience whatever are not apt to arrive in the "pink" of condition. They collected for me approximately 400 butterflies, and I was very agreeably surprised at the generally fine condition of the insects received.

The collecting during the latter part of January was generally pretty fair, and during the first part of February, excepting for some cool spells lasting from one to two or three days, the collecting was even better, but towards the end of this month and the first part of March a very cold period, lasting about two weeks or a little more, put an effectual end to the collecting. After the cold period had ended and the days became quite warm again the best collecting of all was had. The weather was generally fine, with very little rain,

and while often the nights and mornings were quite cool, the days were warm. Many flowers were in bloom during the whole period of their stay and most of the butterflies collected were taken on the flowers, *Hesperiidæ* especially frequenting the flowers of a species of mint which grew along the banks of the Hillsborough River on the outskirts of Tampa. Another favorite place in this locality was along a road cut through the jungle of saw palmetto, a road not much used and an ideal place for collecting, although it was more difficult, for once the butterfly darted into the jungle it was lost. Many thistles were in bloom and these were also very attractive to the butterflies.

The specimens were sent to me by parcel post as fast as the boxes were filled and some times reached me only three days after their capture. It was quite novel, indeed, to me, to have butterflies captured on the flowers out of doors, that—in case of the large *Papilios*—hardly needed relaxing, while here everything was snow and ice-bound, and outdoor collecting a long way off.

The collectors returned much improved in health from their outdoor activities and very enthusiastic over their experiences in collecting.

The species collected are listed below and furnish rather interesting early records for a locality as far north as Tampa, where the temperature at times was low enough to produce quite heavy frosts, and even ice on two occasions, during the time these records were made. The earliest record only in each month is given, and in some cases many of each species were collected on other days of the same month. A total of thirty-seven species were collected.

| | | | |
|--|-----------|------------|----|
| <i>Papilio philenor</i> Linn. | Tampa | February | 6 |
| <i>Papilio cressphontes</i> Cramer | Tampa | { February | 20 |
| | | { March | 15 |
| <i>Papilio glaucus</i> Linn. | Tampa | March | 15 |
| <i>Papilio troilus texanus</i> Ehr. | Tampa | March | 14 |
| <i>Papilio palamedes</i> Drury. | Tampa | March | 14 |
| <i>Papilio marcellus</i> form <i>floridensis</i> Holland | Tampa | { February | 21 |
| | | { March | 11 |
| <i>Pieris monuste</i> Linn. | Tampa | February | 21 |
| <i>Catopsilia eubule</i> Linn. | Dade City | January | 16 |
| | Tampa | { February | 6 |
| | | { March | 15 |
| <i>Zerene cæsonia</i> Stoll. | Tampa | { February | 6 |
| | | { March | 15 |

| | | | |
|---|-----------|----------|----|
| | Dade City | January | 16 |
| | Tampa | February | 21 |
| <i>Eurema nicippe</i> Cramer | Dade City | January | 21 |
| <i>Eurema euterpe</i> Men. | Tampa | February | 10 |
| | | March | 11 |
| | Dade City | January | 16 |
| <i>Cissia sosybius</i> Fabr. | Tampa | February | 22 |
| | | March | 8 |
| | Tampa | February | 5 |
| <i>Dione vanillæ</i> Linn. | Tampa | February | 23 |
| <i>Phyciodes phaon</i> Edwards | | March | 15 |
| | Dade City | January | 19 |
| <i>Phyciodes tharos</i> Drury | Tampa | February | 9 |
| | | March | 15 |
| | Dade City | January | 19 |
| <i>Vanessa atalanta</i> Linn. | Tampa | March | 15 |
| <i>Vanessa virginiensis</i> Drury | Tampa | February | 21 |
| | | March | 15 |
| <i>Junonia cœnia</i> Hubn. | Tampa | March | 19 |
| <i>Basilarchia archippus floridensis</i> Strecker | Tampa | March | 15 |
| <i>Calephelis virginensis</i> Gray | Tampa | March | 19 |
| <i>Strymon melinus</i> Hubn. | Dade City | January | 19 |
| <i>Goniurus proteus</i> Linn. | Tampa | February | 20 |
| | Tampa | March | 19 |
| <i>Epargyreus tityrus</i> Fabr. | Tampa | March | 8 |
| <i>Thorybes daunus</i> Cramer | Tampa | March | 10 |
| <i>Cocceius pylades</i> Scudder | Tampa | February | 10 |
| | | March | 11 |
| <i>Thanaos horatius</i> Scud. & Burg. | Tampa | March | 8 |
| <i>Thanaos terentius</i> Scud. & Burg. | Tampa | March | 8 |
| <i>Thanaos brizo somnus</i> Lintner | Tampa | March | 15 |
| <i>Ancyloxypha numitor</i> Fabr. | Tampa | February | 6 |
| <i>Hylephila phylæus</i> Drury | | March | 10 |
| | Tampa | February | 20 |
| <i>Polites cernes</i> Bdv. & Lec. | | March | 10 |
| <i>Polites baracoa</i> Lucas | Dade City | January | 19 |
| | Tampa | March | 14 |
| | Tampa | February | 8 |
| <i>Polites brettus</i> Bdv. | | March | 10 |
| | Tampa | February | 9 |
| <i>Atalopedes campestris</i> Bdv. | | March | 10 |
| <i>Lerema accius</i> Abbott & Smith | Tampa | March | 19 |
| <i>Lerodea eufala</i> Edwards | Tampa | February | 8 |
| | | March | 18 |
| <i>Lerodea maculata</i> Edwards | Tampa | February | 25 |

GENERAL NOTES ON THE LEPIDOPTERA OF THE
CANAL ZONE, ISTHMUS OF PANAMA.

THOMAS HALLINAN,

PATERSON, N. J.

The Heliconidæ seem to be more numerous in species and individuals than any other family of Rhopholocera on the Isthmus and their presence in the dense jungles and forest groves adds a charm of color to the prevailing green. They are seldom seen in the open except on flowering shrubs along the trails. From about the summer solstice to middle December in the rainy season they are very numerous on the wing but adults are found throughout the year.

The tailless *Papilios* are found in about the same dense jungle as the Heliconidæ, favoring more, perhaps, the water courses. Their bright spots of sharp colors are very conspicuous when they fly about in the drizzling rains. They are seldom seen on the wing in the dry season.

The *Caligos* are not commonly seen as they choose the thickets of vine-tangled shrubbery for their short, lumbering flights, but they are found on the wing throughout the year.

The conspicuous *Morphos* are very local and are seldom seen except during November and early December. In certain localities on the wide trails as many as ten to twenty of the *Morpho cypris* can be seen from dawn to about mid-forenoon, flying high and wild. The other *Morphos* fly lower and more steady and are easily attracted by bits of sugar cane.

The Erycinidæ are seen at all times of the year and are generally found along the open trails, resting on the flowers or leaves of shrubs in the sunlight. They seldom fly in the thick jungle.

In the cut-over areas and open sabannas are found many of the Hesperidæ and Pieridæ, the latter seem to favor congregating around damp patches of ground as they do in other parts of the world. The more common species found in the open fields are the *Anarta fatima*, *Anarta jatropha* and a species or two of *Junonia*.

In the groves around Ancon Hill, *Ageronia feronia* is very noticeable when flying about making a snapping noise, which can be heard several yards.

On the hill tops on the hot fair days from about ten o'clock in the morning until about one hour after noon, the flowering shrubs are surrounded by hundreds of butterflies and day-flying moths of numerous species. Many species are usually found at rest only on these hill tops and this is especially true of the tailed *Papilios* with the exception of a species similar to the *Papilio marcellus* which is occasionally seen resting on damp patches of ground in the low lands.

This predilection for the hill tops by certain species among the Lepidoptera is a strange manifestation of their habits of migration.

Perhaps the most striking and spectacular feature in the habits of the Lepidoptera on the Isthmus of Panama, in fact among all insect life in this region, is the occasional marvelous migration of *Uranus fulgens*. During June and July in 1907 this diurnal, asymmetric moth migrated across the Isthmus in a general easterly direction in vast numbers. Group counting indicated that the daily number which passed amounted to hundreds of thousands. They flew no higher than ten feet except at obstructions and the maximum occurred from dawn until about eight o'clock in the morning and from four o'clock in the afternoon until dusk, with a few thousand stragglers during the other daylight hours. They flew along special courses in a rapid, long zig-zag manner and the migration was not interrupted by the rains. Of the millions that passed I only observed one at rest and that was on a leaf. In 1908 and 1909 the migration was limited to a few thousand individuals beginning in late May and extending through June and into July with the same characteristics as the 1907 flight. In 1915 there was another enormous migration but not equal to the number in 1907, but having the same characteristics as to the routes, time, manner of flight and the absence of resting individuals. During these migrations *Uranus fulgens* was observed simultaneously at all points on the Canal Zone and there were about an equal number of males and females.

BOOK REVIEWS.

ORTHOPTERA OF NORTHEASTERN AMERICA WITH ESPECIAL REFERENCE TO THE FAUNAS OF INDIANA AND FLORIDA. BY W. S. BLATCHLEY. The Nature Publishing Company, Indianapolis, 1920. 784 pp., 7 plates, 246 text figures, bibliography, glossary, index to synonyms

and new generic assignments recognized in the work, also general index.

Professor Blatchley, to whose industry entomologists are already indebted, has produced another book that will gain for him the thanks of many students of Nature. This time it is about grasshoppers, katydids and their kin. Following the introductory chapter on classification, structure, collecting, preservation of specimens, etc., there follows the "Descriptive Catalogue of the Orthoptera of the Eastern United States and Eastern Canada." Under this caption, which very closely gives the scope of the book, are included the earwigs or Dermaptera, which are often treated separately. The work is an expansion of the author's Orthoptera of Indiana, issued in 1903. In the present volume 353 species and 58 varieties are recognized, of which the author, on page 4, states that he has personally examined all but five. There are keys for the separation of suborders, families, subfamilies, genera and species; each species is also more fully described under a separate heading, with notes on distribution, song (if it has one), habits, etc. There are also many helpful illustrations. The writers who have made observations which the author has used in preparing these accounts are given full credit, and if Mr. Blatchley does not agree with their opinions, both sides are stated, so that the student will be aware that doubt exists.

It is not to be wondered at that Mr. Blatchley does not agree with some other students as to the limits of certain species, or the names by which they should be known. At the present time we do not know exactly how many species of oaks inhabit eastern North America, nor are botanists agreed as to the names in use; grasshoppers have been studied much less, and are far more elusive. The writer, for instance, from his experience afield and from the specimens collected on Long Island and Staten Island, thinks that *Spharagemon wyomingianum* Thomas and *Spharagemon scudderi* Morse should be considered as distinct, while Mr. Blatchley thinks that *scudderi* is a "synonym of *wyomingianum*," but as usual he devotes much space to the dissenting opinions. Gradually these matters will be more fully adjusted, and meanwhile the entomologist will be thankful that he has at hand so useful and accurate a book containing information often in great detail concerning the Orthoptera of eastern North America.

WM. T. DAVIS.

MANUAL OF THE ORTHOPTERA OF NEW ENGLAND, INCLUDING THE LOCUSTS, GRASSHOPPERS, CRICKETS, AND THEIR ALLIES. BY ALBERT P. MORSE. Proceedings of the Boston Society of Natural History. Vol. 35, No. 6, pp. 197-556, plates 10-29. April, 1920.

This excellent work, which shows great care in its preparation and knowledge of the subjects treated, has been promised to students of Nature for several years, and will now be received with much appreciation. The intro-

duction covers every phase of the subject, such as history of New England Orthopterology, collections of New England Orthoptera, classification, anatomy, habits, geographical distribution, methods of collecting and preserving, etc. The sequence of the families is changed from that of Mr. Scudder's catalogue of 1900, and more nearly conforms to that of Westwood and Kirby, except that the long-horned grasshoppers or Tettigoniidae precede the crickets. A further change has been made in placing the burrowing crickets and pygmy locusts last in their respective families.

The total number of Orthoptera and Dermaptera recorded from New England is 132, of which probably 104 are native and 28 introduced. Undoubtedly several other species known to occur in the State of New York will in time be found in New England.

In the account of the broad-winged katydid, *Pterophylla camellifolia*, there is a quotation from Dr. Harris stating that the eggs of that species are laid in two contiguous rows along the surface of a twig, the bark of which is previously shaved off or made rough with her piercer. Dr. Harris in his "Insects Injurious to Vegetation" states that he is "indebted to Miss Morris for specimens of these eggs." Evidently Miss Morris sent the Doctor the eggs of *Microcentrum* and not of *Pterophylla*, for we have several times seen the broad-winged katydid laying its eggs in slits in pine bark and in that of the common locust. Others have had similar experience. Dr. Packard, Wm. Saunders and Prof. Kellogg all make the same or nearly the same statement regarding the eggs of the broad-winged katydid, and all no doubt copied from Dr. Harris.

On the six colored plates some of the more strikingly marked species are shown, also the several kinds of tree-crickets, while most of the other plates are devoted to finely executed outline figures of structural characters. There is an accented list of scientific names, also a glossary.

WM. T. DAVIS.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF MARCH 16.

A regular meeting of the New York Entomological Society was held at 8 P. M. on March 16, 1920, in the American Museum of Natural History, Vice-President John D. Sherman, Jr., in the chair, with nineteen (19) members and five visitors present.

The Treasurer read a letter from Farmer's Loan & Trust Co., acknowledging addition of \$100 to the Permanent Fund.

Mr. E. A. Smith, 2 Arden St., New York City, was elected an active member.

Several items in current numbers of "Science" were read. Mr. John

J. Davis, present as a visitor, spoke of the manifesto adopted at St. Louis on December 30, 1919, by the Entomological Society of America, and on January 2, 1920, by the American Association of Economic Entomologists, and it was discussed by Dr. Lutz, Messrs. Davis, Lutz and Sherman.

Mr. Comstock, under the title "Notes on African Lycænidae," spoke of the development and distribution of this family of butterflies in the Ethiopian region, illustrating his remarks by specimens of about one sixth of the known species, and by the works of Aurivillius (*Rhopalocera æthiopica* < K. Sv. Vet. Ak. Hand. 1898-1899) and Bethune Baker (Rev. African Lycænesthes < Trans. Ent. Soc. London, 1910). A large part of the specimens shown were collected by Miss McKenzie, a missionary in the Kameruns. Mr. Comstock, after exhibiting maps of Africa, arranged to show its physical characteristics and faunal sub-regions, pointed out that the development of the Lycænidae was remarkable, constituting one third of all the butterflies; and the distribution of one of the subfamilies Lipteninæ almost confined to the Ethiopian region, West Africa being especially their home; while the Lycæninæ were found in all the sub-regions of Africa. The work of all authors since Linnæus was reviewed, Hewitson, Trimen and Bethune-Baker having described the largest number of species.

The following tables of distribution were given:

LIPTENINÆ.

| | Genera. | Species. |
|--------------------|---------|----------|
| West Africa | 18 | 166 |
| South Africa | 6 | 13 |
| East Africa | 4 | 19 |
| Mascarene | none | none |

LYCÆNINÆ.

| | Genera. | Species. |
|--------------------|---------|----------|
| West Africa | 19 | 212 |
| South Africa | 19 | 146 |
| East Africa | 15 | 134 |
| Mascarene | 8 | 32 |

Dr. Avenoff, present as a visitor, spoke of the isolation of the African Lycænidae and of the uncertain boundary between the Palearctic and Ethiopian regions. He exhibited maps showing a transition region appeared to intervene between them, which might be traced through Arabia even to British India.

Dr. Bequaert said that Dr. Avenoff's idea of a strict limit for the bulk of the species and an extra limit for straying insects was interesting. He gave the botanical idea of the distribution of acacia as establishing the northern limit of the Ethiopian region, and pointed out that it was supported by the distribution of honey birds and snails.

The occurrence of certain plants and insects in the highlands of the east coast was due to elevation.

Mr. Wm. T. Davis exhibited a number of specimens of the cicada *Okana-godes gracilis* recently described in the JOURNAL of the New York Entomological Society from Utah and Arizona. Recently he had received two additional males from Bagdad, San Bernardino Co., California, August 6, 1919 (Rehn and Hebard). Mr. Morgan Hebard, who collected the specimens, reported that they were found on low plants, mid an arid environment. He was attracted by the song, which he first thought was produced by an Orthopterous insect. The cicadas ceased singing when he was still some distance from them, which made their final detection rather difficult.

MEETING OF APRIL 6.

A regular meeting of the New York Entomological Society was held at 8 P. M. on April 6, 1920, in the American Museum of Natural History, President L. B. Woodruff in the chair, with seventeen (17) members present.

Dr. Frank H. Chittenden, Washington, D. C., was elected an active member.

Dr. Walther Horn's request for exchange was referred to the Librarian.

Mr. Davis read letters from E. B. Williamson in Venezuela, Dr. W. T. M. Forbes in Panama and R. P. Dow in California.

Dr. Bequaert made some "Remarks on Dolichopodidæ," in which he pointed out first the characters of these small flies in venation, second basal cell always united with discal cell, and the bend or kink in fourth vein; also their frequently being greenish metallic in color; and secondly the remarkable variety in their male characters, as illustrated in Herman Loew's monograph of 1864 (S. M. C., No. 171). He showed his own collection and that of Mr. Burns, also a small European collection, pointing out the absence of striking faunal differences, and the opportunity for further study, Mr. Burns' collection containing seven species new to the New Jersey List and one species new to science. Passing to the habits, he said the adults were not found on flowers or at light but by sweeping low meadows, on rocks in wet places, on moss about springs and sometimes on the bark of trees. Of the larvæ there was much to learn; Marchand had bred *Argyra* from larvæ found in mud among Tabanids; all the larvæ were carnivorous and cannibals, adding to the difficulty of breeding them; some are known to attack Scolytid larvæ. A paper on Diptera Danica IV by Lundbeck in 1912 contains useful data.

Dr. Sturtevant added some details indicating that the prey of the adults is not always enclosed by the proboscis.

Mr. Schaeffer, under the title "Donaciæ of New York State," gave a remarkable exhibition of minute information on this puzzling group. He pointed out that in two especially plastic species, *cincticornis* and *subtilis*, the characters he had found constant in a very large material indicated more species than were recognized in the last published synopsis. Some of these

had been described by early authors and erroneously sunk in synonymy, such as *episcopalis* Lacordaire and *californica* and *dives* LeConte; others would be described by him in a forthcoming revision of the genus.

The New Jersey List, according to his studies, would require revision by changing *proxima* to *episcopalis* Lec.; *distincta* to *torosa* Lec., striking out *hypoleuca* and *femoralis* and *kirbyi* as synonyms and adding six species described by Blatchley and himself.

In discussing the species of New York State, 24 in number, Mr. Schaeffer was unable to finish on account of the late hour, but pointed out the possibility of specimens heretofore called *hypoleuca* being dimorphic forms of *palmata* and the curious fact that the European subgenus *Plateumaris* is apparently more separable there than here, while our species *harrisi* apparently belongs to a subgenus not represented in Europe, characterized by third antennal joint longer than fourth.

In general Mr. Schaeffer favored a recognition of more species and elevating varieties like *proxima* to specific rank.

MEETING OF APRIL 20.

A regular meeting of the New York Entomological Society was held in the American Museum of Natural History at 8 P. M. on April 20, 1920, Vice-President John D. Sherman, Jr., in the chair, with 11 members present.

The Outing Committee announced an excursion to Greenwood Lake on Sunday, May 2d, in conjunction with the Brooklyn Entomological Society.

Mr. Davis read letters from John J. de Vyver and H. H. Ruckes.

Mr. Davis spoke on the Cicadas of the genus *Platypedia* and its allies, placing the older names with certainty and discussing the value of the venation and cells in generic classification. His remarks, which were copiously illustrated by series of specimens, will be printed in full.

Mr. Schaeffer continued his discussion of the *Donacia* of New York State, giving the following list of the species he had recognized, with the diagnostic characters of each as printed in our December JOURNAL:

1. *D. hirticollis* Kirby.
2. *D. cincticornis* Newm.
3. *D. proxima* Kirby.
4. *D. proxima episcopalis* Lec.
5. *D. piscatrix* Lec.
6. *D. palmata* Oliv.
7. *D. rufescens* Lec.
8. *D. edentata* Schffr.
9. *D. parvidens* Schffr.
10. *D. curticollis* Knab.
11. *D. rugosa* Lec.
12. *D. subtilis* Kunze.
13. *D. liebecki* Schffr.

14. *D. megacornis* Blatch.
15. *D. aqualis* Sny.
16. *D. torosa* Lec.
17. *D. tuberculata* Lec.
18. *D. harrisi* Lec.
19. *D. serricauda* Schffr.
20. *D. pusilla dives* Lec.
21. *D. emarginata* Kirby.
22. *D. metallica* Ahr.
23. *D. flavipes* Kirby.
24. *D. rufa* Say.

He also discussed the relation of our species to those of the Palaearctic region.

Mr. Mutchler spoke of the single species occurring in Cuba and Dr. Bequaert of the African species.

Mr. Leng exhibited for Mr. Davis *Cicindela pilatei*, taken at Dayton, Texas, June 22, 1917, by Dr. Bequaert; also a copy of Cowan's "Curious Facts in the History of Insects."

Mr. Davis spoke of R. Heber Howe, Jr., "Manual of the Odonata of New England," being a Memoir of the Thoreau Museum of Natural History, Concord, Mass., March, 1917, to March, 1920, in which 156 species are named as compared with 124 known to occur around New York.

Mr. Davis also showed a photograph of Mr. Shoemaker's painting of Lepidoptera with a short account of the years spent in producing it. The painting will be exhibited in the American Museum of Natural History.

Mr. Burns exhibited Insects from the Palisades and Dr. Bequaert commented on certain interesting features thereof, especially the date of mating for a species of *Lasius*, *niger americanus* of which Mr. Davis had taken a queen on Staten Island April 19.

MEETING OF MAY 4.

A regular meeting of the New York Entomological Society was held at 8 P. M. on May 4, 1920, in the American Museum of Natural History, President L. B. Woodruff in the chair, with 17 members present.

Mr. Nicolay reported for the Outing Committee.

Mr. Leng invited the members to join the Staten Island Bird Club walk May 8th.

Mr. Sherman invited the members to his house, 132 Primrose Ave., Mt. Vernon, on May 15.

Mr. Olsen, under the title "Another European Leafhopper in North America," read a paper illustrated by drawings and specimens, disclosing the European origin of *Eutettix osbornii* Ball. This paper will be printed elsewhere. It was discussed by Dr. Bequaert and Messrs. Barber and Dickinson.

Mr. Notman exhibited "Coleoptera collected at Windsor, N. Y., with remarks on Distribution," in which he reviewed the geological history of this

continent and the life zones of this State, as indicated by vegetation; giving some interesting comparisons from his own collections at widely separated points for genera like *Brachinus* and *Bembidium*. The locality at Windsor, N. Y., had proved especially interesting from the mixture of northern and southern forms and the number of new species, 12 out of 423, requiring description.

Mr. Notman's remarks were discussed by Messrs. Angell, Woodruff and Davis.

Mr. Angell recorded finding a *Cicindela sexguttata* at Rattlesnake Creek, the Bronx, New York City, April 25; remarkable for its small size and unusual color.

Mr. Woodruff reported his visit to Washington and conveyed the good wishes of Messrs, Schwarz, Caudell, Aldrich and Barber to our members.

A CORRECTION.—Page 20, *Agrilus obscuro-guttatus* Gory should read *Agrilus obsoletoguttatus* Gory. H. Notman.

INDEX TO NAMES OF INSECTS AND PLANTS IN VOLUME XXVII.

Generic names begin with a capital letter. New genera, subgenera, species, subspecies, varieties and *nomina nova* are printed in italics.

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